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OPERATION AND SERVICE MANUAL

Microvision 15
Programmable Wafer Inspection Station

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MICROVISION 15
PROGRAMMABLE WAFER INSPECTION STATION
OPERATION AND SERVICE MANUAL

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INTRODUCTION

Section 1

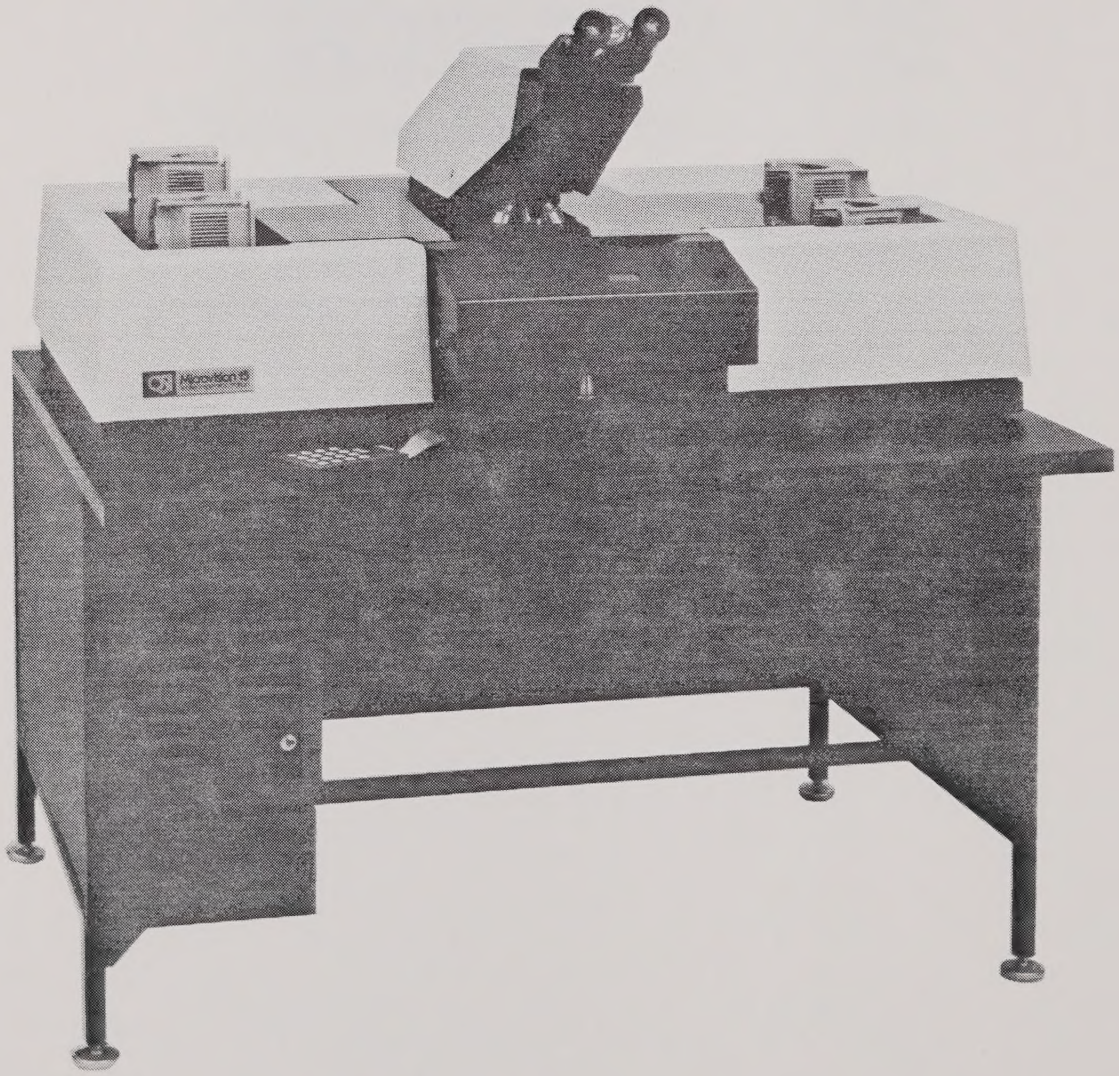


Figure 1-1.
Microvision 15 Programmable Wafer Inspection Station

INTRODUCTION

GENERAL DESCRIPTION

The Microvision 15 Wafer Inspection Station is a fully automated system designed by Optical Specialties Incorporated for rapid high-magnification inspection of semiconductor wafers. Every wafer may be inspected at up to 64 pre-programmed wafer sites for consistent data collection and yield analysis.

The MV-15 system has unmatched throughput capability in both sampling and 100% inspection modes. This capabilty is enhanced by a high quality microscope with the proprietary OSI Autofocus System and an automatic wafer handling system. The latter eliminates wafer scratches, and provides a contamination-free environment which improves yields.

The system has also been designed for operator comfort. The work surface at the base of the system provides a resting area for the operator's forearms. The keypad may be shifted to either the left or right sides for operator convenience. The microscope has been projected forward to permit comfortable operator seating. Also, the autofocus and internal vibration isolation table features assist by reducing eye strain and increasing operator efficiency.

Thorough review of this manual will assist in maintaining trouble-free system operation. If any questions arise concerning the performance of your OSI Inspection Station, please call Field Service at (415) 490-6400.

EQUIPMENT WARRANTY

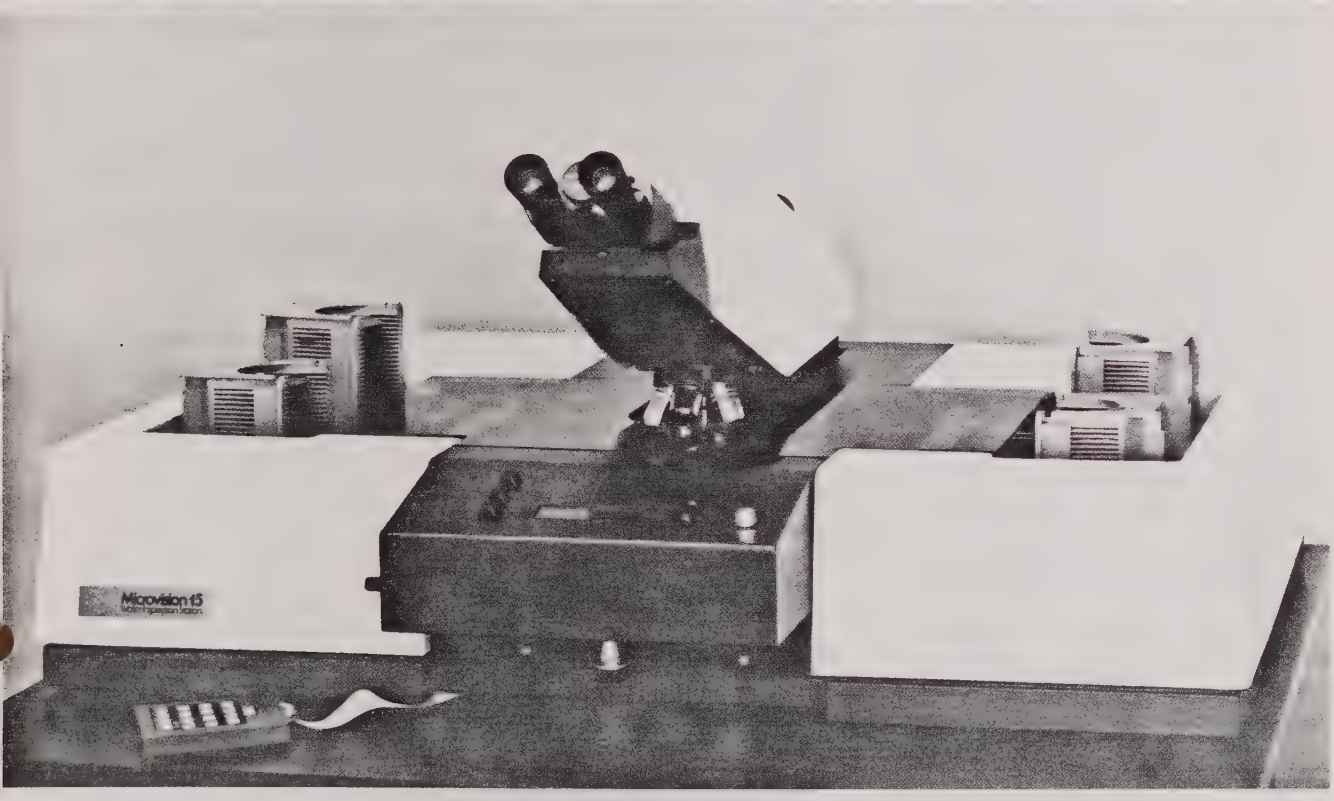
OSI warrants that the products delivered under this order will be free from defects in material and workmanship under normal use and service. OSI's obligations under this warranty are limited to replacing, repairing, or giving credit for, at its option, any of said products, if within six (6) months after shipment, they are disclosed to OSI's satisfaction to be thus defective.

This warranty is stated in lieu of all other warranties of merchantability and fitness for a particular purpose, and of all other obligations or liabilities on OSI's part, and it neither assumes, nor authorizes any other person to assume, for OSI, any other liabilities in connection with the sale of the said articles. This warranty shall not apply to any product which shall: have been repaired or altered, except by OSI, or in accordance with any handling or operating instructions supplied by OSI; or which shall have been subjected to unusual physical or electrical stress, misuse, abuse, negligence or accidents. The aforementioned provisions do not extend the original warranty period of any product which has been either repaired or replaced by OSI.

OSI shall not, under any circumstances, be liable to the Buyer for incidental or consequential damages for loss of use, or other commercial loss of whatever nature arising out of, connected with, or resulting from the sale, by OSI, of any product ordered hereunder, including without limitation, any liability of the Buyer to a customer to whom the Buyer sold a product or equipment containing a product sold hereunder.

MICROVISION 15
Programmable Wafer Inspection Station

OSi



Eliminates wafer damage, increases yields and throughput, and simplifies process data collection.

THE MV-15 FEATURES:

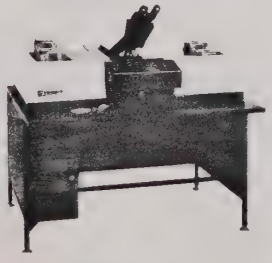
AUTOMATIC WAFER HANDLING–Automatic wafer handling system provides unmatched throughput. Cassette-to-cassette operation means no tweezers or vacuum wands, eliminating wafer breakage and damage, and improving yields. Wafers are efficiently transferred in a contamination-free environment. Result: higher throughput, better yields.

MOTORIZED, PROGRAMMABLE STAGE–Inspect every wafer at the same preprogrammed location for consistent data gathering and analysis. Create up to 16 programs with up to 64 inspection points (256 points total). Program inspection pauses of from 0.1 second to indefinite.

AUTOMATIC FOCUS–Laser-based, high-resolution automatic focus eliminates time-consuming focusing, eyestrain and operator fatigue––inspection throughput is increased and high inspection standards maintained. Wafers are kept constantly in focus––especially important for high-magnification inspection. Dynamic feedback system requires no image and works equally well on patterned or unpatterned wafers.

VIBRATION ISOLATION–Unitized microscope and stage assembly is isolated with four self-regulating Barry mounts. Image remains motionless and is not affected by ambient vibrations and machine functions.

OPERATOR COMFORT–Proportional-speed joystick positioner is centrally located for right-or left-handed operation. Control keypad is easily shifted to the right or left side and LCD display is centrally located. Air-bearing stage assures easy-on-the-eyes, smooth operation. Viewing eyepieces are well extended toward the operator for viewing comfort and for maximum separation from the wafer surface to avoid contamination.



DATA COLLECTION–Entries for up to 99 defect categories are easily recorded at the control keypad. Wafers are dispositioned to accept, rework and reject cassettes. System accumulates defects by site and by type, plus totals of wafers skipped, accepted, reworked and rejected. Pencil-and-paper defect recording is eliminated.

SAMPLING INSPECTION–Programmable skip allows inspection of 100% of the wafers in the load cassette or sampling every n^{th} wafer. Use in virtually all your inspection applications.

SELF-CONTAINED–The MV-15 is completely self-contained, including vibration-isolating table and electronics cabinet. Requires minimum floor space.

QUALITY IMAGE–High-quality optics assure best possible visual image. A wide choice of microscope systems, eyepieces and objectives is available.

SYSTEM RELIABILITY–Careful manufacturing and stringent quality assurance, combined with clean, efficient design, provide maximum system reliability and uptime.

Microvision 15 Programmable Wafer Inspection Station

DESCRIPTION

The MV-15 is an automated system for examining and classifying in-process wafers. It consists of a wafer handling system, a motorized, programmable stage, and an auto-focusing microscope.

A wafer is transported from the send cassette to an automatic prealigner where it is properly oriented, then moved onto the stage for inspection. While one wafer is being inspected, a second is fed onto the prealigner and oriented. Meanwhile wafers to be skipped are sent directly to the adjacent ACCEPT carrier. Both operations occur during inspection of the first wafer, providing maximum throughput.

The 6" x-y travel stage is positioned with a proportional-speed joystick controller which also controls 360° chuck rotation. Initially, sites are programmed by positioning the stage at desired sites. Under preprogrammed control, the stage moves automatically to these sites. Up to 16 programs, with up to 64 points per program (to a maximum of 256 points), can be entered. An inspection pause of from 0.1 second to indefinite is programmed--the stage will delay this amount of time at each site.

Optional software includes a "serpentine" scan for detecting reticle-generated, repeating defects on the wafer.

The laser-based focus system is automatically operative when the wafer is positioned beneath the microscope objective and tracks focus as the wafer is positioned. Focus can be overridden with up/down buttons to examine features outside normal focus or on underlying layers.

Observed defects are recorded by depressing numeric entries on the control keypad. Up to 99 defect categories, 10 maximum per site, can be recorded.

Wafers are dispositioned to the waiting three receive cassettes by pressing appropriate ACCEPT, REWORK OR REJECT buttons. The system automatically senses full or empty cassettes (or the absence of a cassette) and directs appropriate actions. Loading a new send cassette, for example, is automatically sensed and causes the system to begin unloading wafers, sending to the prealigner, etc. Cassettes are readily accessible to the operator.

Throughout inspection, the operator is prompted by a 40-character LCD display.

At the end of an inspection lot, accumulated defects are displayed or printed by site and type, as well as total number of wafers skipped, accepted, rejected and reworked. Available SECS interfacing software enables transmitting the data to a host computer, as well as uploading and downloading inspection programs.

An integral DIAGNOSTICS routine permits reading status of all sensors, and exercising belt drives, cassette elevators and stage movement to assure proper system functioning.

STANDARD CONFIGURATION

Microscope

- Brightfield, incident light
- 5-place turret with 20X objective
- Auto-focus system: resolves to better than one-half the depth of focus of objective being used.
- 10X high-eyepoint eyepieces

Stage

- Motorized, programmable (16 programs, 64 points per program, 256 points total)
- Air-bearing, self-regulating, vibration-isolated
- 6" x-y travel
- 360° theta rotation under joystick control
- x-y-θ joystick, proportional-speed controller, 1 μm resolution
- 4 μm repeatability

Prealign

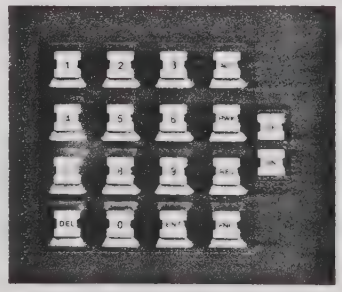
- Flat alignment to ±.008", x and y
- Air-cushioned, roller-actuated
- Sized for 3", 100, 125 or 150 mm wafers

Indexers

- One send, three receive indexers
- Auto-sensing for cassette full, empty or on elevator

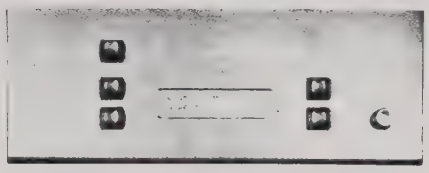
Keypad Controller

- Numeric 0-9, ENTER and DELETE
- Up/down focus override
- Wafer disposition to ACCEPT, REWORK and REJECT
- FUNCTION returns to Main Menu



Console Panel

- 2 x 20-character LCD display
- Main menu with branching display to SET UP, INSPECT, INPUT/OUTPUT and DIAGNOSTICS modes
- Displays wafers skipped and dispositioned to ACCEPT, REWORK and REJECT
- Displays accumulated defects by site and category.



OPTIONS

- Software: SECS II interface for transmitting defect data to host computer and uploading-downloading inspection programs
- Software: serpentine scan for detecting repeating reticle defects on stepper-processed wafers
- Motorized objective turret
- Brightfield/darkfield, DIC and fluorescence microscope systems
- Trinocular microscope body
- Conversion to 3", 75, 125 or 150 mm wafer sizes
- ¼" pitch carrier spacing
- HMS Height Measurement System
- Wide range of objectives and eyepieces
- Pneumatic adjustable chair
- 21-column thermal printer

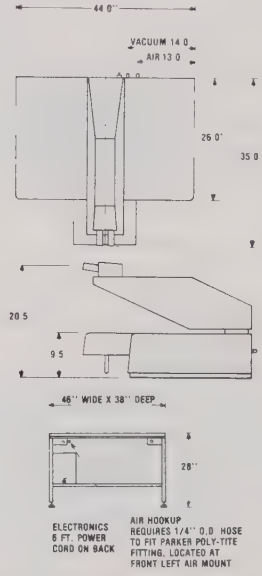
SPECIFICATIONS

Dimensions: 22" × 44" × 30" (height × width × depth)

Shipping Weight: 500 lbs. (3 crates, 91 ft.3)

Services Required:

Air: 10 SCFH @ 60 psi
Vacuum: 5 SCFH @ 20" Hg
Electrical: 120/220 VAC, 50/60 Hz, 5/2.5 amp



ORDERING INFORMATION

Specify:

- 3", 75, 100, 125 or 150 mm wafer size (others available)
- Cassette manufacturer and model (Standard carrier spacing is 3/16" pitch; ¼" carrier spacing is optional.)
- 10X or 15X eyepieces
- Power requirements

Optical Specialties Inc.

4281 Technology Drive
Fremont, California 94538
415/490–6400 □ Telex 171596

SYSTEM DESCRIPTION

Section 2

SYSTEM DESCRIPTION

SYSTEM SPECIFICATIONS

Facility Requirements:

Dry air or nitrogen - 60 PSIG @ 10 SCFH
Vacuum - 20 in. Hg. @ 5 SCFH
120 VAC; 5 Amp.

Performance:

Autofocus accuracy - +/-0.5 micron @ 400X
Stage resolution - 1 micron
Stage repeatability - 4 microns
Prealigner repeatability - +/-0.008 in.

Standard Operator Controls:

Keypad input with the following single button functions: Numeric 0-9; Accept; Rework; Reject; Function delete; Enter; Focus up; Focus down. A five button display console allows selections for system setup, inspection processes, program input and data output, diagnostics and display role.

Standard System Features:

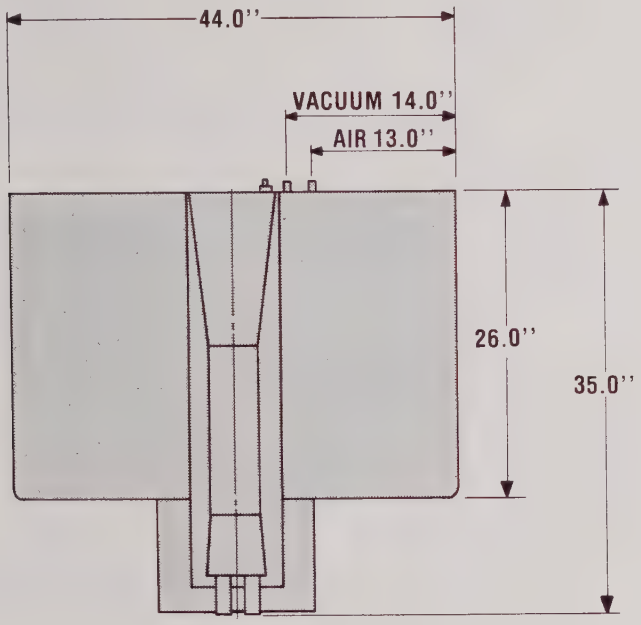
40 character alpha-numeric display
64 programmable inspection sites
10 defect categories for each site
99 defect categories total
X,Y and Theta offset correction
Programmable skip from 0 - 9 wafers
RS232 communication port

Autofocus Laser:

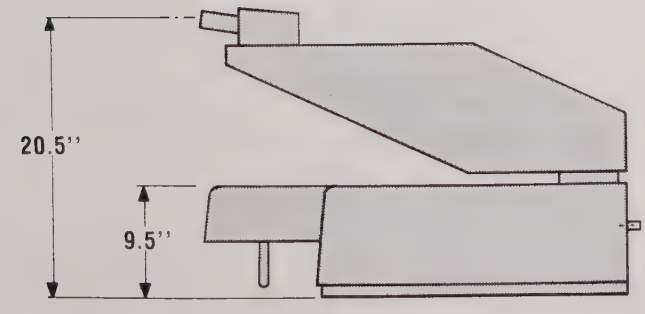
Two milliwatt Helium-Neon (HeNe) laser emitting at 638.2 nanometers (red) and protected to Title 21, CFR 1040.10 and 1040.11. The system is certified as Class II.

SYSTEM SPECIFICATIONS (cont.)

Physical Dimensions:



Top View



Side View

Figure 2-1

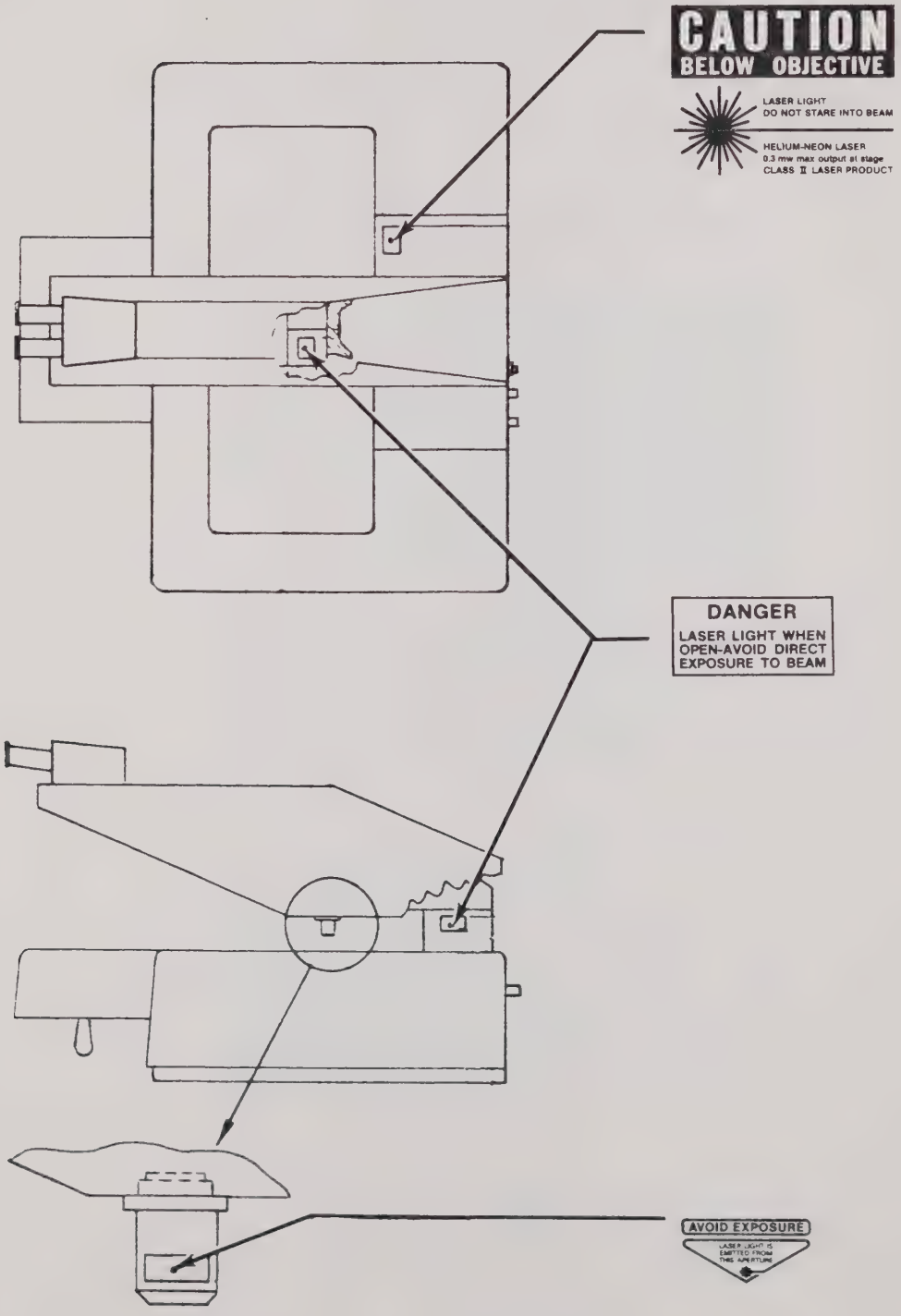
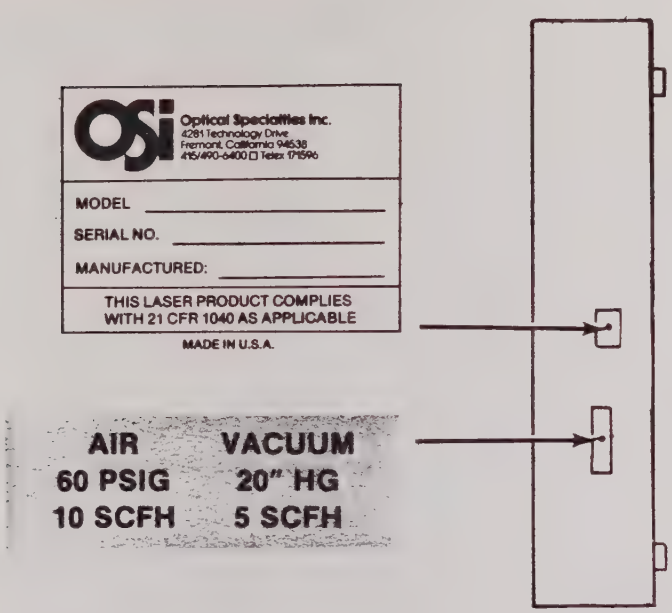


Figure 2-1A Laser Safety Label Locations



BACKSIDE OF ELECTRONIC CHASSIS

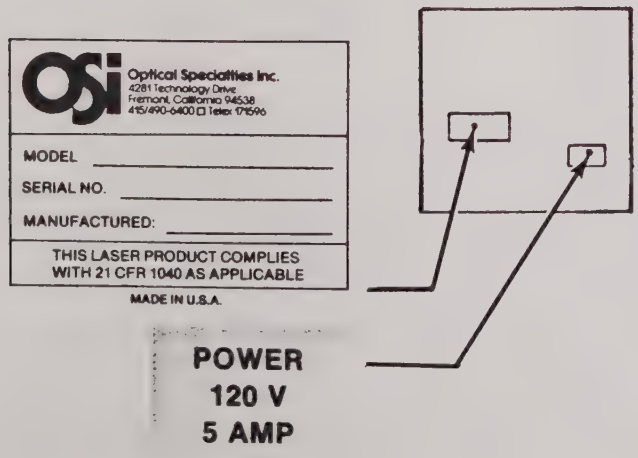
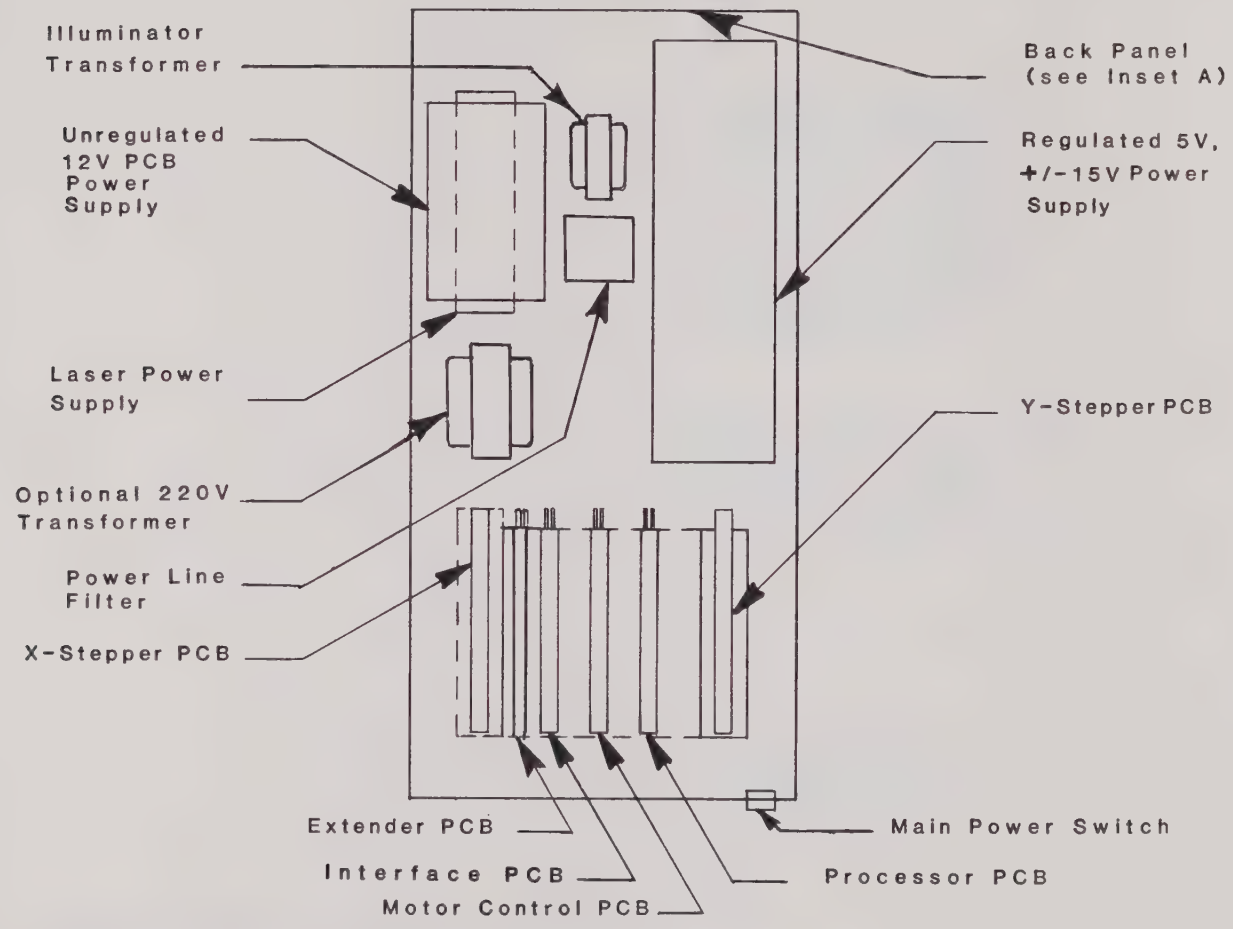


Figure 2-1B Label Locations



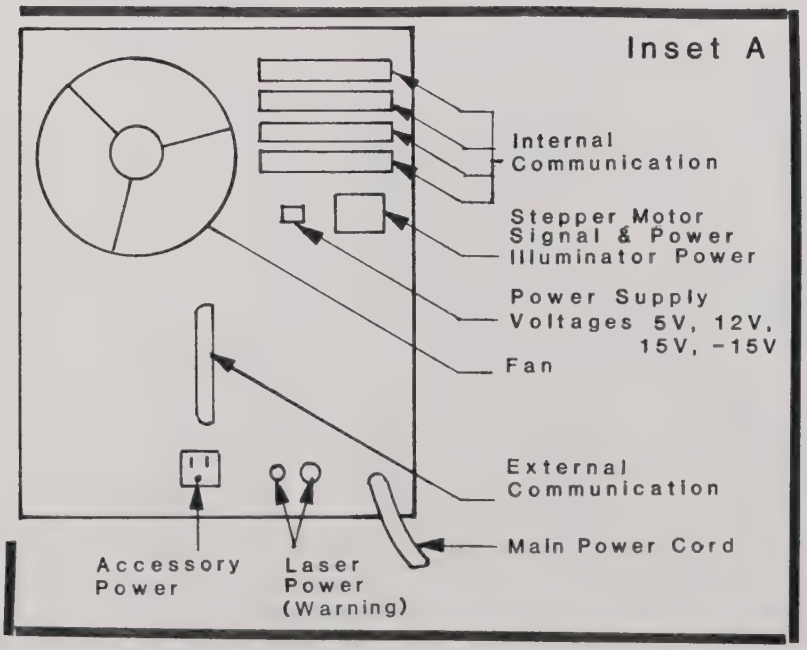


Figure 2-2

Electrical Chassis Assembly

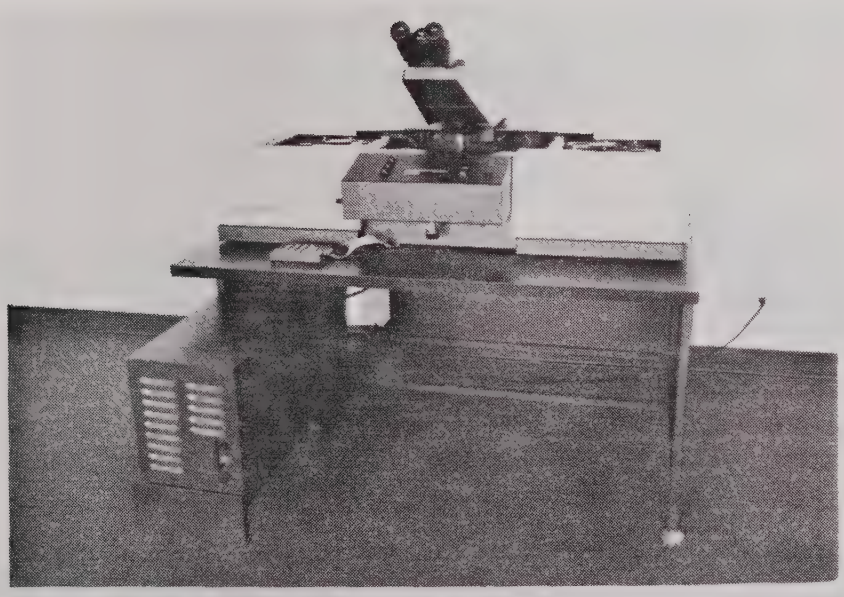


Figure 2-3 Electrical Chassis Assembly

ELECTRICAL CHASSIS ASSEMBLY

The electrical chassis assembly is contained in the brown metal pull-out cabinet located below the vibration isolation table (see Figure 2-3). It contains the system power supplies and the primary logic PCBs (see Figure 2-2). The main power switch, the power ON indicator and the system fuse are located on the front panel.

The main power switch may be flipped to the upper, ON, position if the required facilities have been connected as specified in the installation section of this manual. With the power on, the indicator will light, the wafer indexers will rise to their upper limits of travel and an initialization message will appear on the control console followed by the main menu.

SYSTEM DESCRIPTION

CONTROL CONSOLE

The control console (See Figure 2-4), located to the front and center of the system, permits the operator to communicate with the unit.

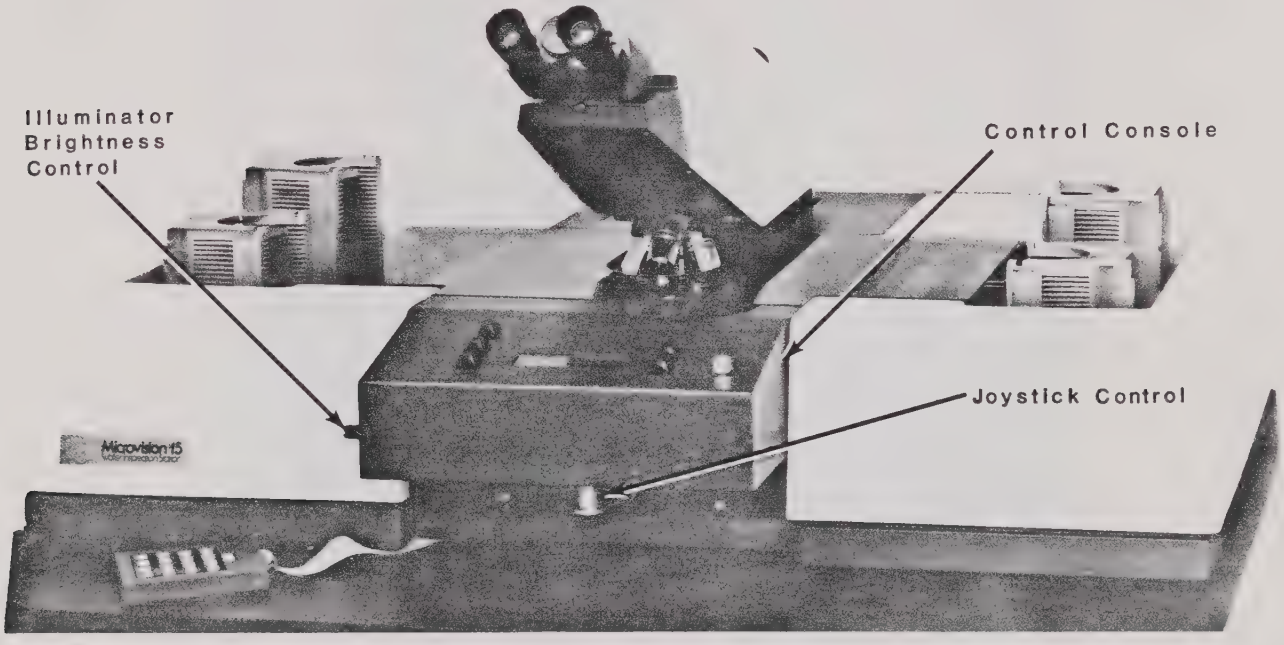


Figure 2-4 Control Console

The 40 character alpha-numeric display panel (see Figure 2-5) presents entry options and prompts to the operator for appropriate action. There are five buttons on the display panel. The top left button rolls the display between pages of the accessed function menu. The remaining four buttons implement the menu functions shown on the adjacent display. A laser emission indicator is located to the lower right. The illuminator brightness control is located on the left side of the control console housing.

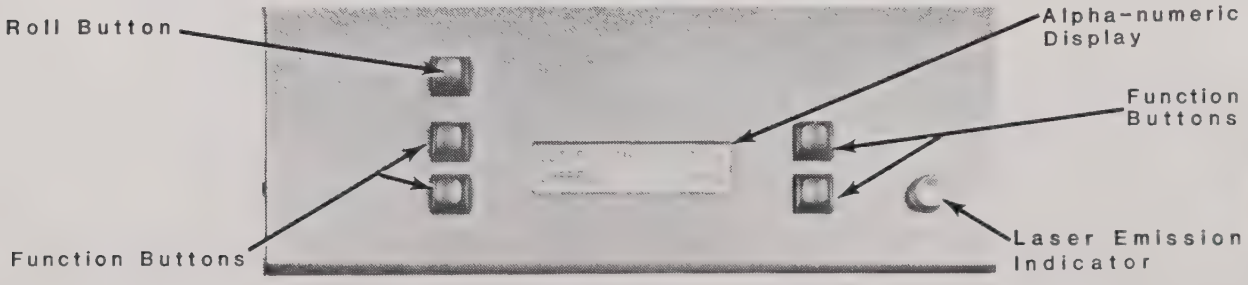


Figure 2-5 Display Panel

SYSTEM DESCRIPTION

The joystick controller located below the console manually positions the wafer in the X and/or Y directional axis for programming or inspection. The wafer moves in the same direction as the joystick. The speed of wafer travel is proportional to the amount of joystick movement. Rotating the joystick handle in the THETA mode turns the wafer in a clockwise or counter-clockwise direction.

SYSTEM DESCRIPTION

KEYPAD

Commands and data are entered into the system using the numeric keypad (See Figure 2-6). The keypad is located on the work surface at the front of the station. It is connected to the system by a flexible ribbon cable, so that the keypad may be placed on either side of the control console. Key function descriptions follow.

Numeric keys 0-9 enter numeric data into the system memory in response to prompts or as defect data.

ACC, RWK and REJ are the Accept, Rework and Reject indexer keys, respectively. Pressing one of these keys dispositions an inspected wafer to the appropriate receive indexer.

UP and DN are the up and down manual focus keys, respectively. Pressing one of these keys interrupts the inspection program, disables the autofocus and manually focuses the wafer. The wafer moves in the direction indicated by the key.

DEL, the delete key, eliminates previous operator keypad entries on the display. It can be used to interrupt an inspection program.

ENT, the enter key, enters numeric information into memory, or implements a command or diagnostic. It can be used to re-enter an interrupted inspection program.

FNC, the Function key, returns the display to the main menu.

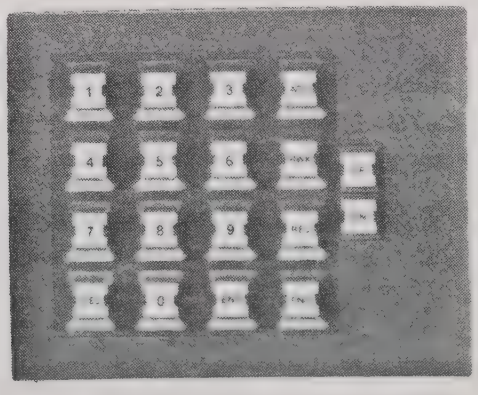


Figure 2-6 Keypad

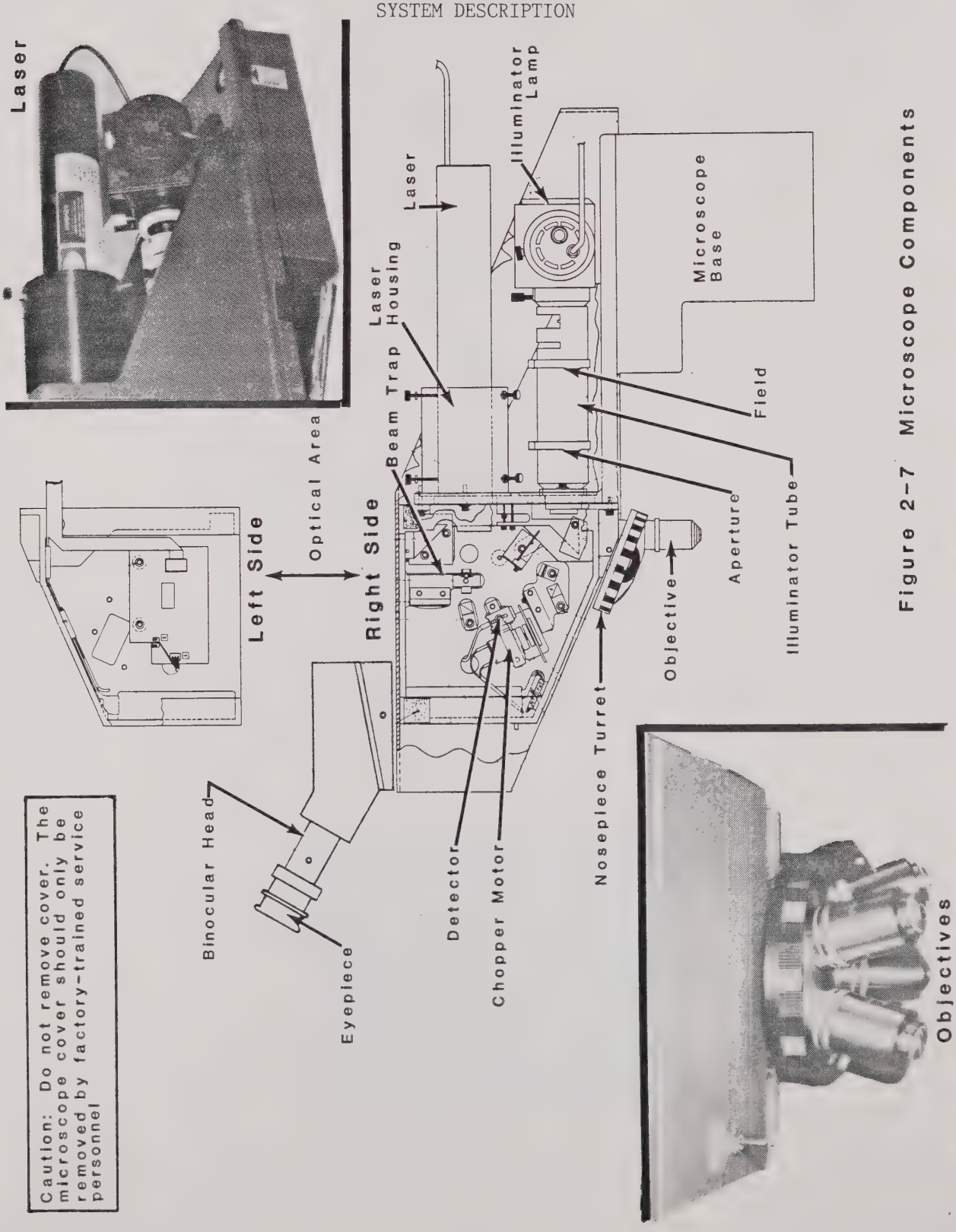


Figure 2-7 Microscope Components

Caution: Do not remove cover. The microscope cover should only be removed by factory-trained service personnel

SYSTEM DESCRIPTION

MICROSCOPE (Refer to Figure 2-7)

The microscope is attached to the vibration isolated base casting assembly. It contains the optics necessary for viewing the wafer and automatically focusing it using OSI's proprietary laser-based system.

The Microvision 15 is a laser product which conforms, as of the date of manufacture, to the federal standards of the Bureau of Radiological Health as set forth in Title 21, CFR 1040.10 and 1040.11. The system has been certified as a Class II laser product. It has been designed to protect the operator from any hazardous laser light exposure. The following precautions should be observed to ensure continued certification compliance.

CAUTION

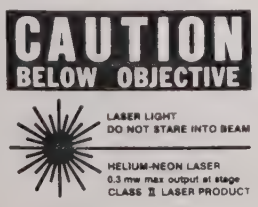
THE MICROSCOPE COVER SHOULD ONLY BE REMOVED BY FACTORY TRAINED PERSONNEL.

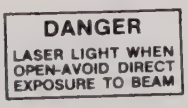
CAUTION

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE.

The Microvision 15 has been designed to allow adjustment of the wafer transfer system as required. Laser removal/replacement or any adjustment requiring the microscope cover to be removed should be performed only by factory trained personnel. Removal of the microscope cover allows access to as much as 5 milliwatts of Helium-Neon (HeNe) laser light.

The information labels attached to the system, and duplicated below, are provided to inform the operator, technician, and service person that the possibility of exposure to laser light exists so that appropriate care may be exercised.





SYSTEM DESCRIPTION

The components, functions and a description of the microscope follow.

Autofocus

The proprietary OSI laser-based automatic focusing system operates by analyzing the location of a spot of laser light which has been retro-reflected from the wafer under inspection. It is a closed-loop system that vertically moves the loaded wafer chuck in response to error signals received at the detector. A beam trap is located in the viewing optics to prevent the laser dot from being viewed through the eyepieces.

The autofocus system uses a 3 milliwatt Hughes Helium-Neon (HeNe) laser located at the rear of the microscope. CAUTION: THE LASER SHOULD NEVER BE REMOVED EXCEPT BY FACTORY TRAINED SERVICE PERSONNEL.

The laser is energized by the main power switch. The switch also energizes a red light on the control console. This serves as an emission indicator to inform the operator that the laser is energized.

Turret Nosepiece

The Turret Nosepiece can hold up to five magnifying objectives which may be rotated into position as the operator desires. It also serves as a laser beam block when positioned either between objectives, or on a blocked objective aperture in the viewing path. A darkfield microscope, with a four position turret, is available as an option. It serves as a beam block in the same manner.

Both Turret Nosepiece systems include a standard 20X objective when they are shipped from the factory. Several other objectives are available, ranging from 5X to 100X magnification, in brightfield and darkfield.

Binocular Head

The Binocular Head is mounted to provide comfortable operator viewing of the wafer inspection sites and, at the same time, provide separation between the operator and the wafer to prevent contamination. A trinocular head is available as an option.

The eyepiece pairs are available in 10X and 15X magnification. They may be rotated to adjust the focus to the operator's eyes, allowing the operator to view the inspection sites with or without glasses.

Autofocus Preamp PCB

The Autofocus Preamp PCB is located on the left side of the microscope. It amplifies the signals received from the photodiode detectors and sends them to the Motor Control PCB.

Illuminator

The Illuminator is located in the rear of the microscope and illuminates the inspection sites on the wafer. It has both field and aperature adjustments (brightfield only) to optimize the light at the inspection site. The intensity of the light is adjusted by a control on the left side of the control console.

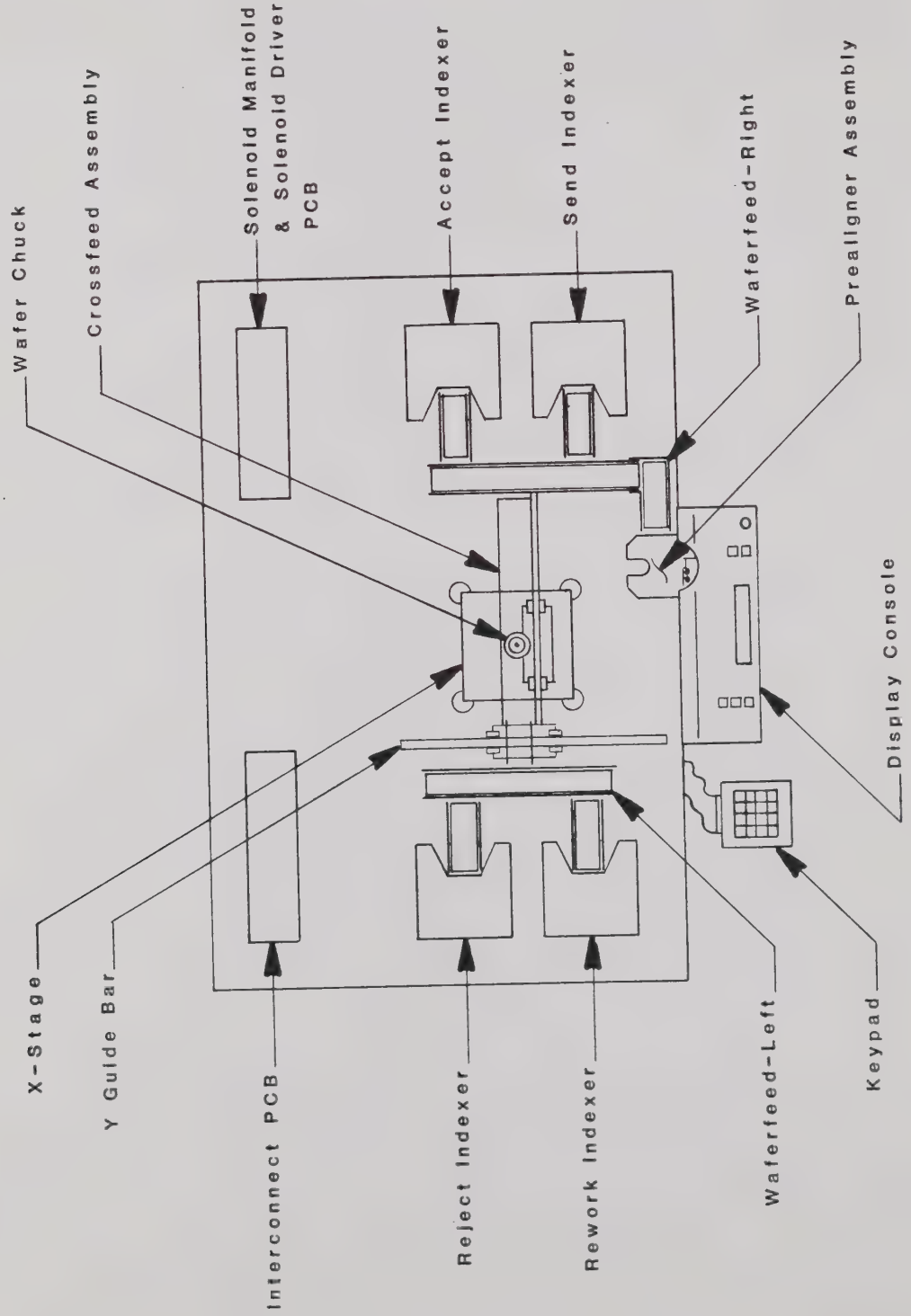


Figure 2-8 Wafer Handler

SYSTEM DESCRIPTION

WAFER HANDLER (See Figure 2-8)

A description of the wafer handler subassemblies follows. The wafer handler is responsible for loading wafers from the send indexer to the transfer plate for inspection or to the Accept indexer in the Skip mode. The wafer handler also unloads wafers from the chuck, following inspection, to the receive indexers.

Wafer Indexers

The wafer indexers transport wafers between the cassettes and the wafer feed assemblies. The system uses four indexer modules; two on each side. One indexer has been designated as the Send or input module. The other three indexers are Receive or output modules. The receive indexers are individually designated as the Accept, Rework or Reject module. Their locations are shown in Figure 2-8.

When the system is first turned on, the indexers will rise to their upper limit of travel, if not already there. Only two modules will index at a time. To activate the indexers, empty cassettes are placed on the receive modules. Align the cassette crossbar with the indexer plate slot shown in Figure 2-9 below.

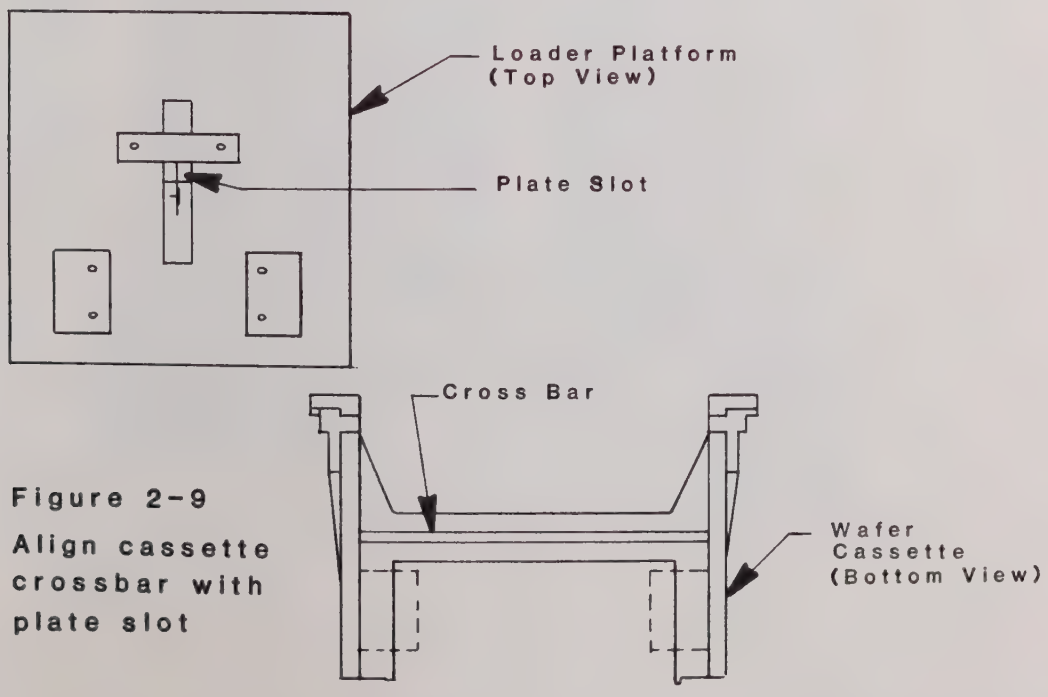


Figure 2-9
Align cassette crossbar with plate slot

The receive indexers will descend to their lower limits of travel, aligning the top cassette slots with the transfer belts. The indexers will then be ready to receive wafers. Place a cassette of wafers on the Send indexer. The module will descend until the bottom wafer is aligned with the transport belts. To proceed beyond this point, refer to the Operation section of this manual.

Wafer Feed Assemblies

The wafer feed assemblies are bi-directional wafer transport mechanisms located to the left and right of the microscope. The right wafer feed mechanism (See Figure 2-10) delivers wafers from the Send indexer to the transfer plate and from the right Y-stage crossfeed belts to the Accept indexer. The left wafer feed mechanism delivers wafers from the left Y-stage crossfeed belts to the Rework or Reject indexers.

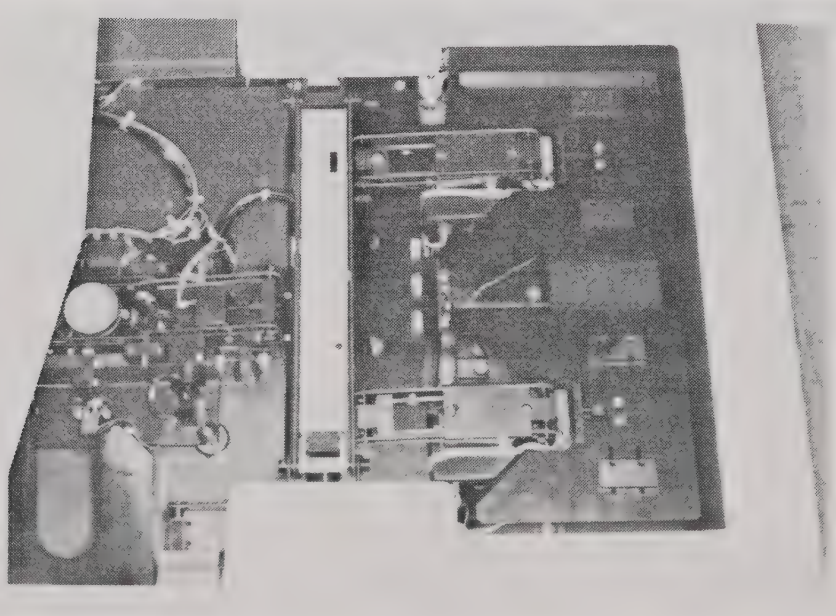


Figure 2-10 Right Wafer Feed Mechanism

SYSTEM DESCRIPTION

Prealign Assembly

The prealign assembly, located to the front and left of the right wafer feed , consists of the horseshoe-shaped transfer plate and the two adjacent stainless steel rollers. During prealign, the plate supports the wafer to be inspected on a cushion of air as the counter-rotating rollers align the major flat of the wafer toward the operator. Following prealign, the wafer is vacuum-secured to the plate to prepare it for transfer to the X-stage chuck.

Transfer Assembly

The transfer assembly is located beneath the right wafer feed mechanism. The transfer assembly transports the prealigned wafer to the X-stage chuck for inspection. It tilts the transfer plate downward and extends the wafer to the chuck where it is deposited. The assembly then retracts to allow another wafer to feed onto the transfer plate.

SYSTEM DESCRIPTION

INSPECTION ASSEMBLIES

A description of the inspection assemblies follows. The inspection assemblies provide the working area and handling capability for the wafer during inspection.

Base Casting Assembly

The base casting assembly is the internal table, located in the center of the system, upon which the microscope is mounted. The base casting is supported by four air shocks and provides isolation from vibration. Base casting height is automatically adjusted by self-leveling air pressure regulators. The top of the base casting provides a running surface for the X and Y stages.

X-stage

The X-stage is the square-shaped mechanical assembly on the base casting running surface. It is supported by four air bearing feet. The X-stage assembly (See Figure 2-11) includes the wafer chuck. The chuck physically supports the wafer being inspected and holds it in place with vacuum. It moves vertically to focus the wafer under the fixed-height microscope. A theta rotation drive motor can rotate the wafer/chuck clockwise or counter-clockwise.

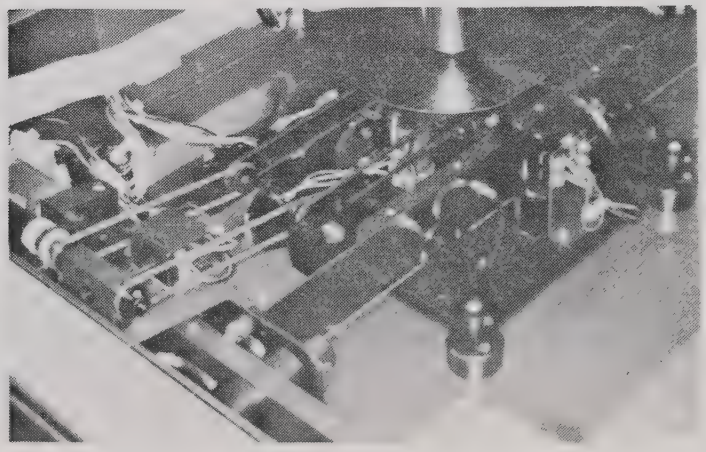


Figure 2-11 X and Y Stages

Y-stage

The Y-stage (See Figure 2-11) is the long, rectangular mechanical assembly on the base casting running surface. It is supported by three air bearing feet. The cross feed belts on the Y-stage transport the inspected wafer from the X-stage chuck to the wafer feed assemblies. The stepper motor on the left side of the Y-stage moves the X-stage left and right. A stepper motor on the base casting moves the Y-stage forward and rearward.

SYSTEM SOFTWARE

The standard MV-15 software package enables the user to create and operate up to sixteen (16) wafer inspection programs containing as many as 64 inspection locations per program, with a maximum of 256 total locations.

The software may be programmed to define: data output and storage modes, duration of inspections at each location, inspection pauses for operating adjustments, and wafer "skips" for lot sampling. Inspection site locations, area scan perimeters and reticle "jump" distances may also be programmed.

The software also provides the capability to: review or advance through an inspection program, manually focus at an inspection location (by overriding Autofocus), set temporary location markers, verify wafer defect data, accumulate/display lot data, output data through a printer (where available), upload data to a host computer (when SECS communication capability becomes available) and obtain system diagnostic information.

A detailed description of the software for your MV-15 programmable wafer inspection station is contained in other sections of this manual. See the Table of Contents for the location of specific programming and operating information.

SERIAL NO.# 2096

MFG DATE December 1983

VERIFIED BY Kathy Amann

MICROVISION 15

BRH CHECK

OPERATION CHECK	INITIALS
Beam Block Operation (Turret rotates to block beam)	PA
Beam Trap Operation (No Laser spot visible in eyepieces)	PA

POSITION CHECK	INITIALS
S/N Certification Label (Rear Panel)	PA
Non-Interlocked Labels (Right Side of Microscope Base)	PA
Non-Interlocked Label (Inside Microscope Cover)	PA
Laser-Light Emission Label (On each Objective)	PA

EMISSION MEASUREMENTS	INITIALS
LEFT EYEPIECE .038 (Maximum .1 microwatts on any objective read at OSI)	PA
RIGHT EYEPIECE .036 (Maximum .1 microwatts on any objective read at OSI)	PA
TURRET NOSEPIECE .12 (Maximum .3 milliwatts at OSI with objective removed)	PA

SYSTEM DESCRIPTION

MICROVISION SYSTEM OPTIONS

NIKON Microscopes and Objectives

PART NO.#	DESCRIPTION
02-04701-00	5X Brightfield Objective
02-04690-00	10X Brightfield Objective
02-04703-00	20X Brightfield Objective (Standard on Brightfield system)
02-04705-00	40X Brightfield Objective
02-05041-00	60X Brightfield Objective
02-05042-00	100X Brightfield Objective
14-06532-00	100X Brightfield Objective Kit (Includes electronic modification. Required for field retrofit)
01-06540-00	Darkfield/Brightfield system (Replaces standard Brightfield system)
02-05044-00	5X Darkfield/Brightfield Objective
02-05045-00	10X Darkfield/Brightfield Objective
02-05046-00	20X Darkfield/Brightfield Objective (Standard on Darkfield/Brightfield System)
02-05047-00	40X Darkfield/Brightfield Objective
02-05048-00	60X Darkfield/Brightfield Objective
02-05049-00	100X Darkfield/Brightfield Objective
14-06533-00	100X Darkfield/Brightfield Objective Kit (Includes electronic modification Required for field retrofit only)
02-05058-00	Trinocular Head in place of Binocular Head
02-04699-00	Binocular Head (Spare)
02-04699-00	15X Eyepiece (pair)
01-06539-00	Bino-Low Assembly (Does not include Binocular Head)

SYSTEM DESCRIPTION

MICROVISION SYSTEM OPTIONS

LEITZ Microscopes and Objectives

PART NO.#	DESCRIPTION
01-06723-00	LEITZ Brightfield Microscope in place of standard NIKON Microscope.
02-06598-00	5X Brightfield Objective
02-06600-00	10X Brightfield Objective
02-06602-00	20X Brightfield Objective (Standard on Brightfield System)
02-06604-00	50X Brightfield Objective
02-06606-00	100X Brightfield Objective
14-06740-00	100X Brightfield Objective Kit (Includes electronic modification. Required for field retrofit)
01-06596-00	LEITZ Darkfield/Brightfield Microscope in place of standard NIKON Microscope.
02-06599-00	5X Darkfield/Brightfield Objective
02-06601-00	10X Darkfield/Brightfield Objective
02-06603-00	20X Darkfield/Brightfield Objective (Standard on Darkfield/Brightfield System)
02-06605-00	50X Darkfield/Brightfield Objective
02-06608-00	Trinocular Head
02-06709-00	6.3X Adjustable Oculars
02-06609-00	16X Ocular Fixed
02-06696-00	6.3X Ocular Fixed

SYSTEM DESCRIPTION

MICROVISION SYSTEM OPTIONS

LEITZ Microscopes and Objectives

PART NO.#	DESCRIPTION
01-06597-00	LEITZ Florescence Microscope in place of standard NIKON Microscope.
02-06629-00	Filter Module I2 (Final Device Check)
02-06630-00	Filter Module N2 (Positive Photoresist)
02-06698-00	Filter Module D (P-Doped Glass)
02-06710-00	100 Watt Halogen Light Source
01-06628-00	LEITZ Interference Contrast Micorscope in place of standard NIKON Microscope.
02-06643-00	5X Objective with Wollaston Prism
02-06644-00	10X Objective with Wollaston Prism
02-06645-00	20X Objective with Wollaston Prism (Standard with Interference Contrast Microscope)
02-06646-00	50X Objective with Wollaston Prism
02-06647-00	100X Objective with Wollaston Prism

THEORY OF OPERATION

Section 3

THEORY OF OPERATION

The OSI Microvision 15 Wafer Inspection Station (See Figure 3-1) is designed for the rapid visual inspection of semiconductor wafers. It is a complex electro-mechanical and optical platform. The following discussion contains an overview of some of the individual subsystems.

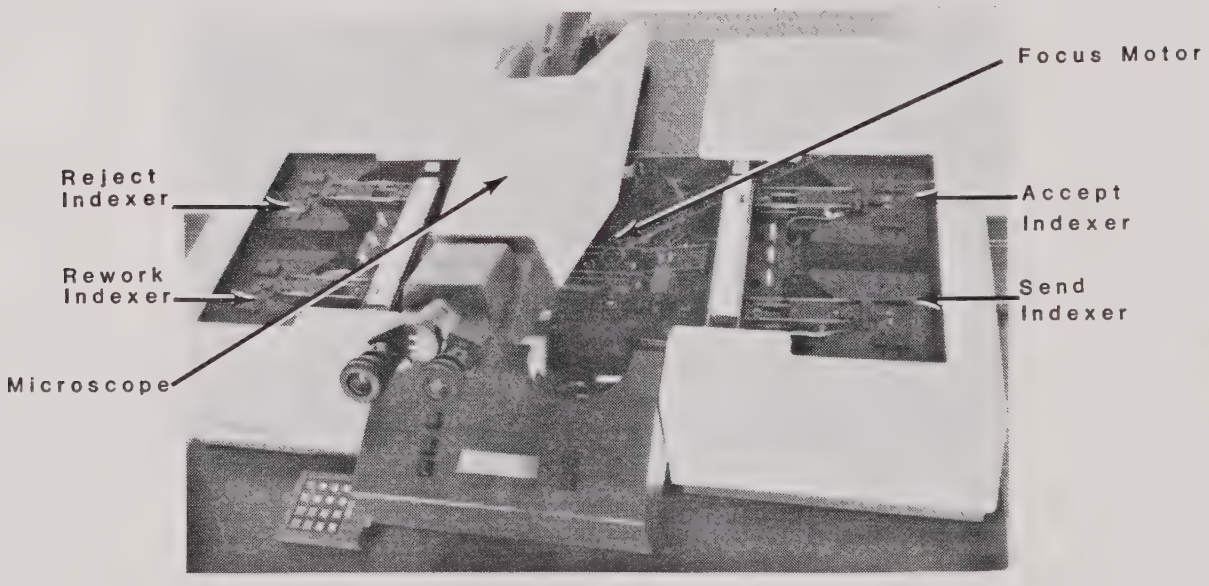


Figure 3-1 MV-15

AUTOFOCUS

The Autofocus system is a proprietary system designed by Optical Specialities Incorporated. It is a closed-loop system consisting of three major functional blocks. The first functional block, the microscope, contains the optical hardware necessary for autofocus including a photodiode detector and a preamplifier PCB. The microscope is responsible for detecting the height of the wafer with respect to focus and generating two squarewave signals that indicate the wafer's condition. These squarewave signals are sent to the second functional block, the Motor Control PCB, for processing.

THEORY OF OPERATION

The Motor Control PCB examines the phase relationship of the incoming autofocus signals and sends a D.C. voltage to the focus motor. The focus motor is part of the Z-axis drive mechanism. This is the third functional block. It is responsible for raising or lowering the wafer from the Motor Control PCB voltage input based on the microscope signal information. As the wafer moves vertically, the microscope provides immediate feedback to the Motor Control PCB.

INDEXERS (See Figure 3-1)

The four indexers used in the system are identical mechanically. The indexer PCBs are identical except for three jumpers on each board. The configuration of these jumpers give each indexer module a separate personality. The indexers all receive the same set of signals through P1 on the PCB. Whether the indexer responds or not is determined by the jumpers. The configurations are as follows:

Sender: J7 Pin 1 to 3
J8 Pin 8 to 10
J9 Pin 1 to 6

Accept: J7 Pin 3 to 5
J8 Pin 6 to 8
J9 Pin 1 to 5

Rework: J7 Pin 3 to 5
J8 Pin 6 to 8
J9 Pin 1 to 4

Reject: J7 Pin 3 to 5
J8 Pin 6 to 8
J9 Pin 1 to 3

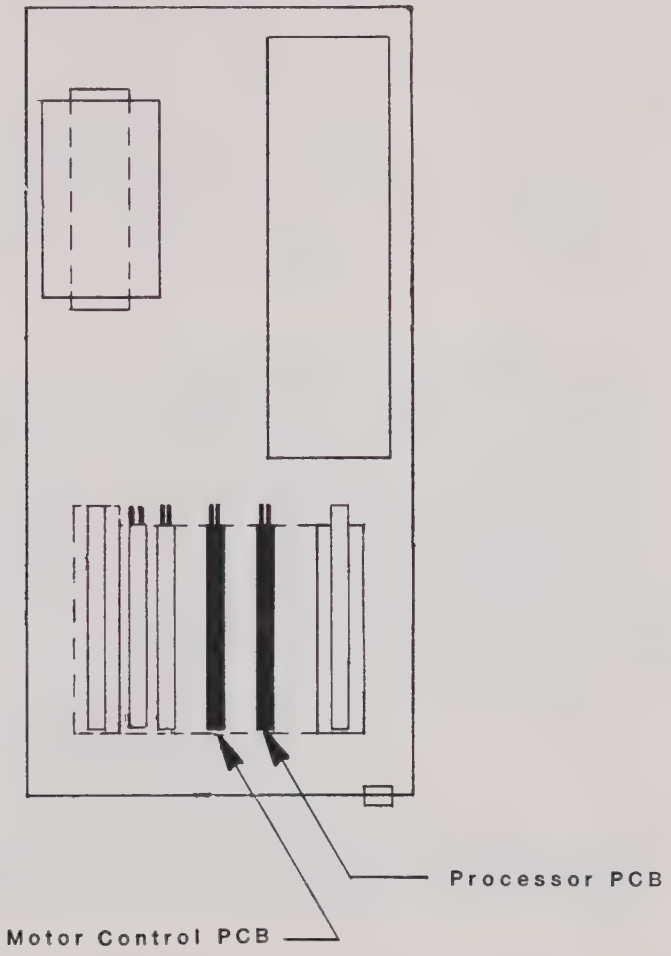


Figure 3-2 Electrical Chassis PCBs

PROCESSOR PCB (See Figure 3-2)

The Processor PCB is located in the far right card cage slot in the electrical chassis assembly. It is the final destination of all sensor input data and the originator of all system control commands. It also generates keypad multiplexing, external commands and character display data.

The main processor is an Intel 8031 microcomputer. Two 8155 microcomputers are used as bus expanders. An 8251 USART is provided for inter-system communication. Program memory and data memory share address space. Addresses from 0 to 32K are assigned to program and/or data memory. Addresses from 32K to 64K are defined as I/O address-mapped instructions. Instructions addressed from 32K to 48K bytes are input commands. Instructions addressed from 48K to 64K bytes are output commands.

THEORY OF OPERATION

The processor is clocked at a frequency of 10 MHz. Program memory consists of up to 16K bytes provided by three or four (optional) 2732 EPROMs of 4K by 8 bits. Data memory consists of 4K bytes or 8K bytes (optional) from two or four 6116 RAMs of 2K by 8 bits. The four Processor PCB buses are identified as: I - input to the processor; O - output from the processor; E - external, communication external to the Processor board, but within the system; and U - USART, communication external to the system.

MOTOR CONTROL PCB (See Figure 3-2)

The Motor Control PCB is located directly to the left of the Processor PCB. It contains the circuitry responsible for focus, chuck rotation (theta), and X and Y stage movement (through the stepper driver PCBs).

The stepper motor controller provides a ramping sequence (acceleration) of the stepper motors, an A/D conversion of the joystick inputs and interfacing to the processor PCB. The Motor Control PCB does not originate commands or keep track of stage positions. It executes commands from the Processor PCB and generates pulses to the stepper motor drivers. Every fourth pulse is sent to the CPU for stage position information. Each pulse to the motor represents 1 micron of stage movement.

The X and Y portions of the motor control are functionally identical. The motor control program is contained within the 8748 microcomputer. The 8748 sends information to the 8253 programmable counter/timer which generates pulses of the proper frequency for the stepper motors. The 8748 also examines its inputs every five milliseconds. It looks first at "X joystick EN." If this signal is present, the contoller reads the A/D converter. The A/D converter is an ADC0808 eight-bit, multiplexed four-channel device. Two of the four channels are being used for the X and Y joystick inputs.

The inputs to the A/D converter are produced by the joystick located below the control console. The joystick contains two potentiometers for movement in the X and Y directions and a third for chuck rotation. The ends of the X and Y pots are connected to +/- 15 volts. The center-seeking wiper is in an approximately nulled position. When the joystick are deflected, a positive or negative voltage, depending upon the direction of deflection, is produced at pins 26 and/or 69 of the Motor Control PCB. The A/D converter can only handle positive voltages. Positive joystick inputs are sent directly to the A/D, while negative voltages are first

sent through an inverting, unity-gain amplifier, then to the A/D. The sign is remembered by two sets of comparator circuit amplifiers.

The X and Y outputs of the 8253 are gated to the outputs of a 6301 motor-inhibit PROM. The outputs of the gates then go to two separate 1 of 4 circuits. Every fourth pulse sends one pulse to the CPU to track the stage position. The stepper pulses exit the Motor Control PCB and through the stepper driver PCBs, drive the X and Y stages.

The focus circuitry is primarily contained within four 6301 PROMs. PROMs 10A, 11A and 12A are used only when performing a coarse focus sequence. PROM 11B performs the autofocus and produces the focus drive signal for both auto and coarse focusing. Counters 15A, 16A, 14A and 13A provide coarse focus parameters.

The chuck rotation (theta) voltage can be produced at pin 33 when "EN CAL theta" is a logic 1 enabling "theta JOYSTICK" at pin 27. An offset voltage is produced when the joystick knob is rotated.

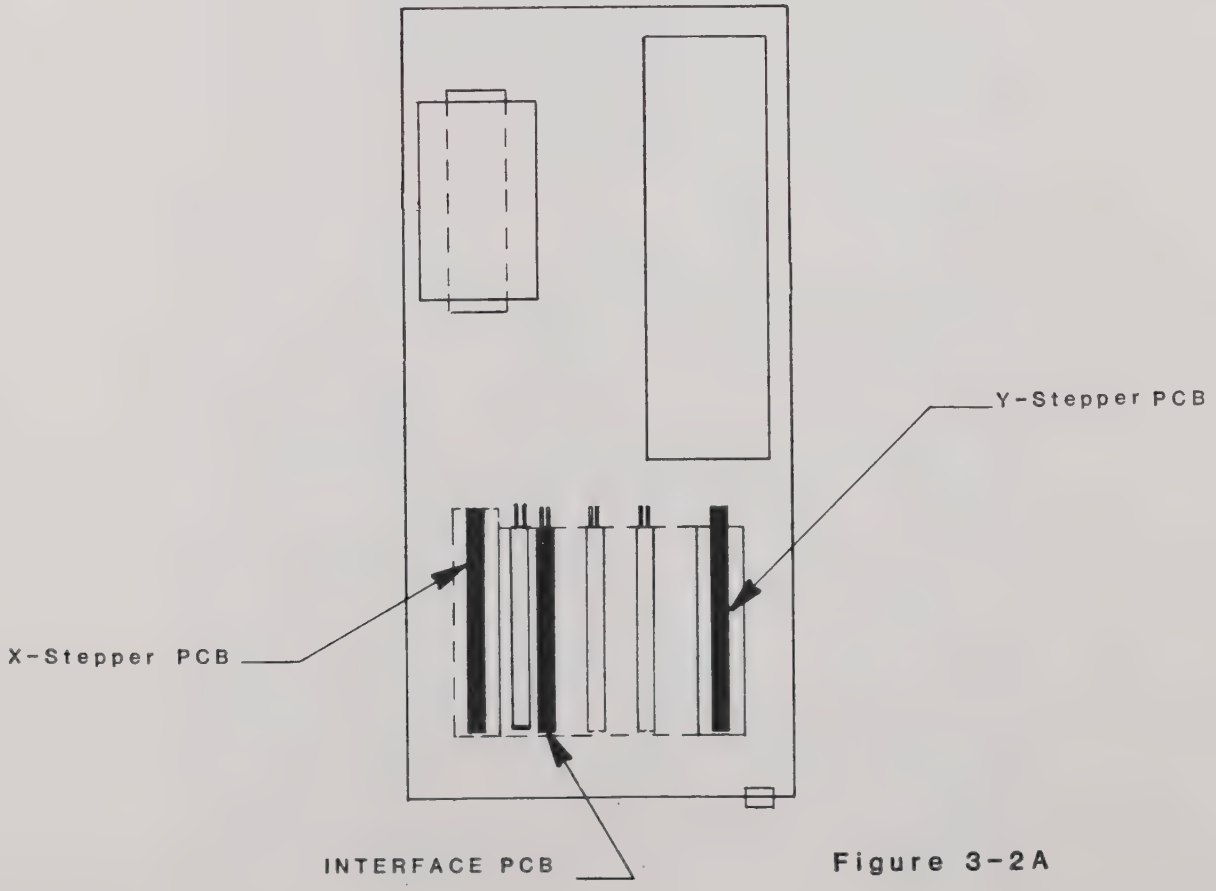


Figure 3-2A

THEORY OF OPERATION

INTERFACE PCB (See Figure 3-2A)

The Interface PCB provides the main buffer and multiplexing of sensor inputs and driver outputs between the Processor and Motor Control PCBs and the system. A slave 8035 microcomputer generates the strobes necessary to multiplex signals to and from the external bus through 74LS244 octal buffers. The CPU processes the information a word (eight bits) at a time. Sensor inputs first pass through either a comparator or band pass amplifier circuit before reaching the octal buffer.

Three types of sensor input circuits occur on the Interface PCB. The first type utilizes an LM339 operational amplifier in a comparator configuration with a 2.5 volt d.c. threshold. When the sensor input voltage reaches the threshold voltage, the comparator output will change state. This output is then sent to an input of an octal buffer for multiplexing onto the bus. There are ten of these circuits on the Interface PCB.

A second type of comparator circuit utilizes a threshold voltage window. This circuit is used to locate the X and Y stage home position. A voltage input between 2.4V and 2.6V indicates the home position. Voltages above or below the window indicate that the stage to one side or the other of the home position. This circuit uses two LM339 operational amplifiers. There are two of these circuits on the Interface PCB.

A third sensor input circuit consists of a band pass amplifier, level detecting diodes and threshold comparator. Strobed and pre-amplified signals from reflective wafer sensors provide the input to the band pass amplifier. The diodes supply a d.c. voltage level to the comparator. The comparator output is then sent to an octal buffer for multiplexing onto the bus. There are six of these circuits on the Interface PCB.

STEPPER MOTOR DRIVER PCB (See Figure 3-2A)

Refer to the following specification sheets for the Compumotor stepper motor driver PCB.

M57 SERIES MOTOR/DRIVER

Compumotor Corporation offers its unique motor and driver package in a standard NEMA 23 flange mount to replace 200/400 step per revolution stepper motors. The Compumotor design offers the low-speed smoothness and freedom from resonance characteristic of DC servo systems combined with the ease of use, direct digital input and brushless design of stepper motors.

The repeatability, accuracy and resolution of the Compumotor system is provided in a compact package which delivers rated torque from 40 to 120 oz-in (30 to 85 N-cm). The M57 Series Compumotors are the logical choice for such applications as: small X-Y stages, optical instrumentation, hydraulic amplifier actuator, mirror drive for laser systems, metering pumps, remote focus applications, floppy disk media testing and many more.

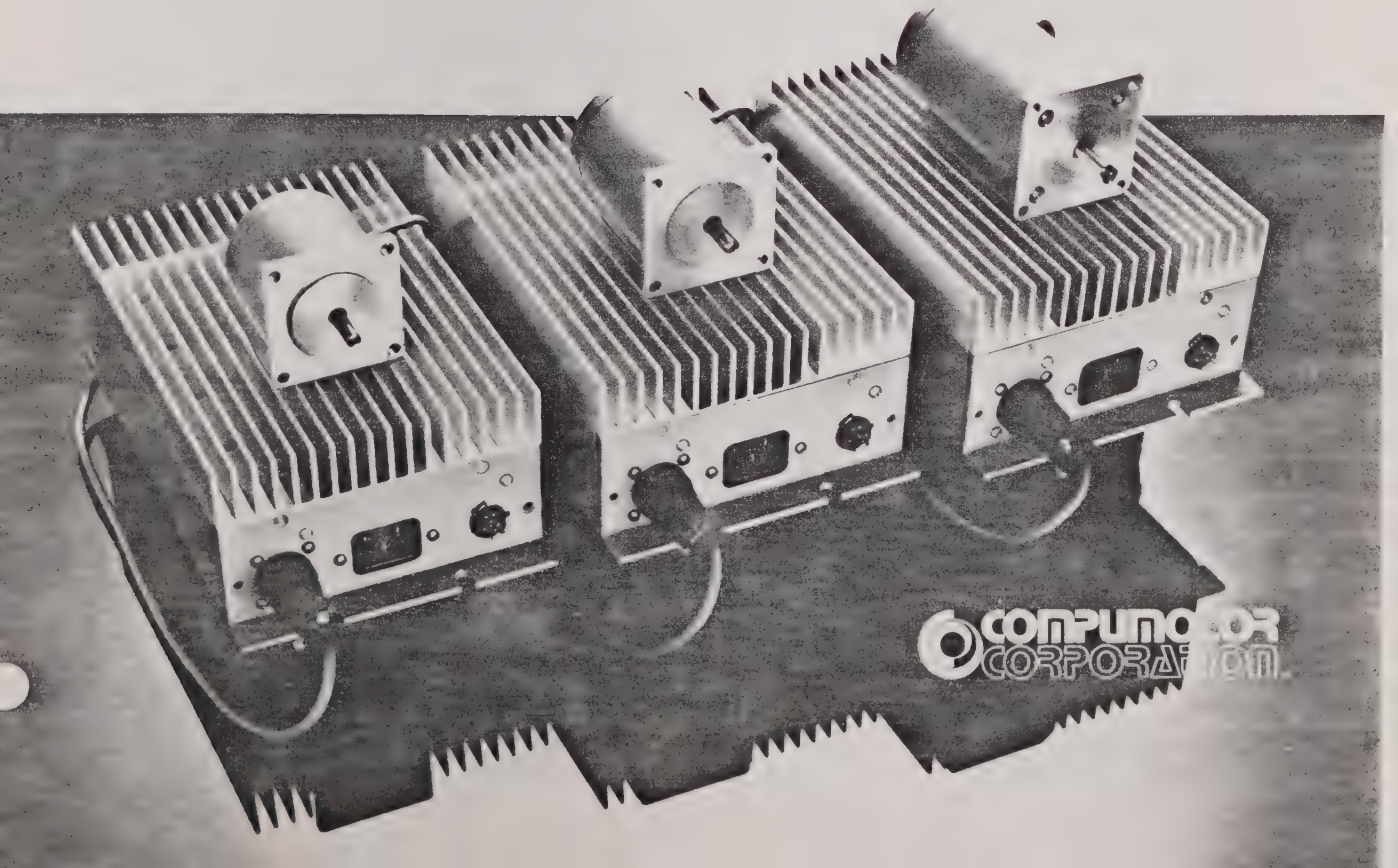
The Compumotor driver takes TTL step and direction inputs and may be controlled directly from your computer. Compumotor Corporation also offers a wide range of microprocessor-based preset indexers for open and closed loop systems to drive Compumotors, stepper motors and microstepping drives in incremental or absolute positioning modes.

	Unloaded[1]	Loaded[2]
Repeatability[3]	± 5 arc seconds	± 20 arc seconds
Absolute Accuracy[4]	± 3 arc minutes	± 5 arc minutes
Relative Accuracy (Step-to-Step)[4]	± 20 arc seconds	± 40 arc seconds

	1 Arc Minute	Standard	Metric	0.01 Degree	High Resolution
Resolution (steps per rev)	21,600	25,000	25,400	36,000	50,000

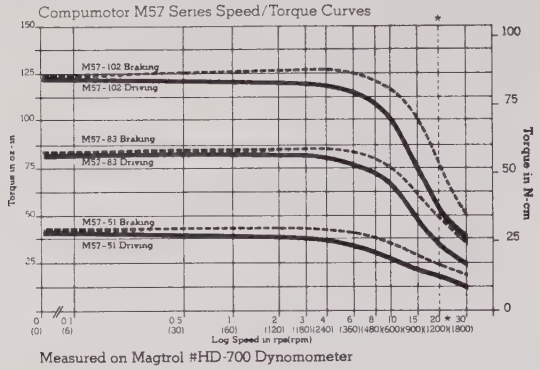
Notes: All measurements made using the Standard Resolution Compumotor. Comparable results would be obtained with other resolutions.

[1]Motor bearing and seal friction only (approx. 2 oz-in or 1,4 N-cm)
[2]Friction load equal to 20% of rated torque; independent of inertia.
[3]Ability to rotate 1 complete revolution and return to start point approaching from the same direction.
[4]Non-cumulative



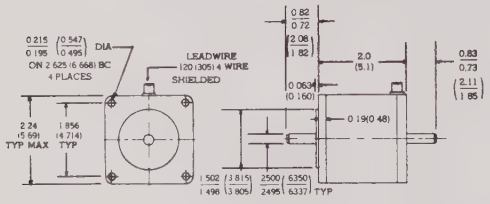
SPECIFICATIONS

Compumotor M57 Series Speed/Torque Curves

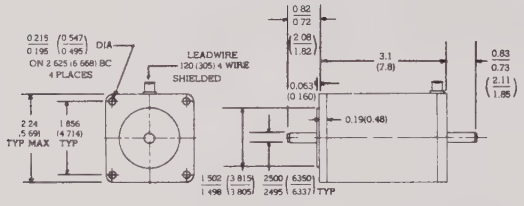


Measured on Magtrol #HD-700 Dynomometer

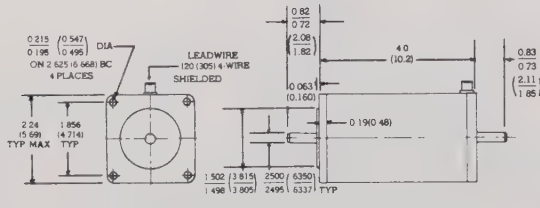
M57-51 40 OZ-IN (30 N-CM) STATIC TORQUE



M57-83 80 OZ-IN (55 N-CM) STATIC TORQUE



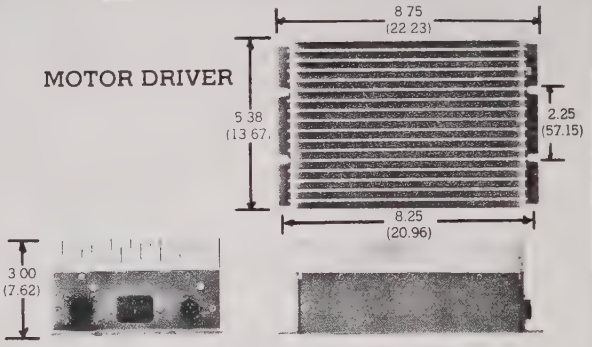
M57-102 120 OZ-IN (85 N-CM) STATIC TORQUE



Notes:
1. Dimensions in inches or (cm)
2. Motor Bearings are Class I
3. Motor Class is "B"
4. Deceleration Duty Cycle 100% for inertias less than 800 oz-in²
5. Max. Thrust Loading—25 lbs. (11.3 kg.)
6. Max. Overhang Load—15 lbs. (6.8 kg.)

***In-use tests Recommended above 20 rps**
Specifications Subject to Change without Notice.

MOTOR DRIVER



Heatsink Fin Area is 350 in² (2258cm²)

		M57-51	M57-83	M57-102
Rotor Inertia	oz-in² (kg-cm²)	0.48 (0.088)	1.28 (0.234)	1.75 (0.320)
Max Theoretical Torque/Inertia	oz-in / oz-in-sec²	32,175	24,131	26,475
Motor Case Temp. Rise Free Air	1 rps °F (°C)	52 (29)	58 (32)	54 (30)
	5 rps °F (°C)	61 (34)	68 (38)	63 (35)
	10 rps °F (°C)	40 (22)	54 (30)	50 (28)
Motor Case Dissipation Watts	1 rps	6	9	11
	5 rps	7	12	13
	10 rps	5	8	10
Maximum Driver Temperature Rise	°F (°C)	18 (10)	22 (12)	25 (14)
Driver Heatsink Dissipation in Watts		30	37	42
Maximum Driver Input Current at 117 VAC in A		0.8	0.9	1.0
Motor + Cable + Connector Weight—Net	oz (kg)	23 (0.65)	35 (0.99)	47 (1.33)
Driver Weight Only—Net	oz (kg)	64 (1.81)	64 (1.81)	64 (1.81)
Shipping Container for Motor + Driver	oz (kg)	40 (1.13)	40 (1.13)	40 (1.13)

Environmental Specifications
Operating: Driver—32 to 122°F (0 to 50°C)
Motor—32 to 158°F (0 to 70°C)
20 to 90% Humidity, Non-condensing
Storage: —40 to 185°F (—40 to 85°C)

Electrical Specifications
Input Power: 105 to 125 VAC 50/60 Hz
TTL Inputs: 3.5 to 6.0 V pulse height
500 nsec pulse width minimum
20 ma minimum current

The Computer Movement that started a Revolution

COMPUMOTOR CORPORATION
1310 Ross Street, Petaluma, CA. 94952 (707) 778-1244
(800) 358-9068 Outside California

INSTALLATION

Section 4

INSTALLATION

INSPECTING AND UNPACKING THE SYSTEM

Although OSI packages its products to minimize the possibility of damage in transit, such damage may result from improper handling, carelessness or unavoidable accident. Therefore, each package should be opened immediately upon arrival and its contents inspected for damage. If damage is found, report it to OSI's Field Service Department, at (415) 490-6400, and file claims with the carrier or your insurance company as appropriate.

One large shipping crate should contain the MV-15 wafer inspection station, a binocular or optional trinocular optic head packaged with eyepieces in a styrofoam box, the keypad, a plexiglas cover, an air filter and spare O-rings. A second large crate contains the supplied vibration isolation table. The third, smaller, crate contains the electrical chassis assembly which holds the major logic PCBs and the system power supplies.

Remove the vibration isolation table from its crate and install it in its designated location. Remove the two plastic machine covers from the station. Loosen the clamps holding the inspection station to the crate base and place it on the table. (Four integral handles on both sides are provided for lifting.) Caution is urged, as the inspection station weighs approximately 250 pounds. Proper lifting techniques should be used.

Remove the electrical chassis assembly from its crate. Place the assembly on the isolation table's integral pullout shelf.

INSTALLATION

INTERNAL ELECTRICAL CONNECTIONS

At the left and rear of the inspection station is a ribbon cable harness and a discrete wire harness. Route these harnesses through the hole in the back panel and allow them to drop behind the table. Plug the four ribbon cables into the connectors on the electical chassis assembly back panel. Twelve-, six- and two-pin connectors appear at the end of the discrete wire harness. Plug these into their respective connectors on the electrical chassis assembly back panel (See Figure 4-1).

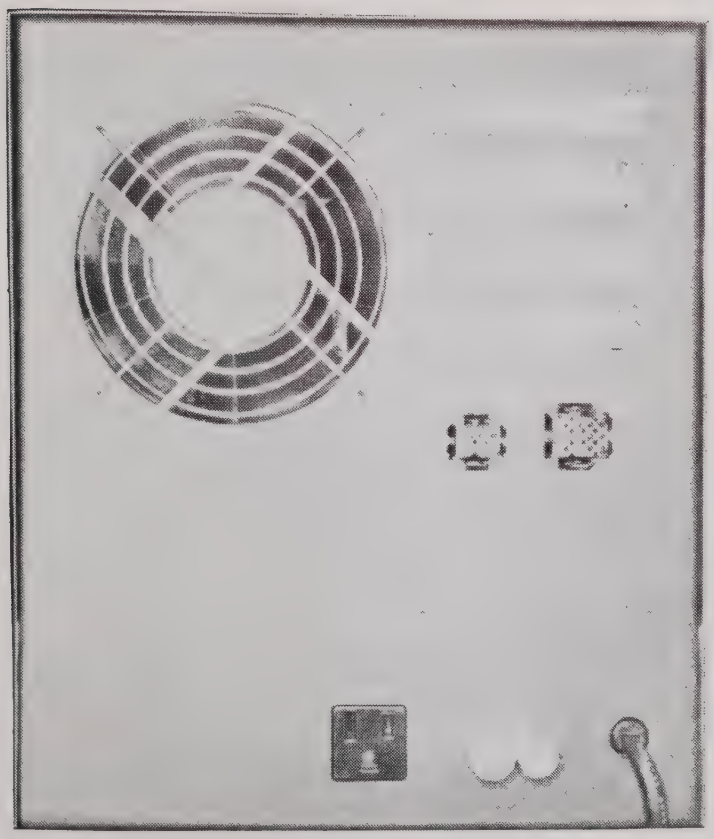


Figure 4-1 Electrical Chassis Back Panel

INSTALLATION

SHIPPING CLAMP REMOVAL

Clamps are provided within the inspection station to hold the moveable subassemblies in place during shipment. These clamps must be removed before air or nitrogen is supplied to the station.

Slide the inspection station rearward on the isolation table until the front edge of the station can be seen through the inspection opening in the table top. Three large hex-head screws should be visible. Remove only the middle screw.

Slide the inspection station forward on the isolation table until the rear edge of the station can be seen through the inspection opening in the table top. Three more large hex-head screws should be visible. Remove only the middle screw. Place the station in a central position on the table.

Under the microscope, on the internal X/Y running surface, are two mechanical subassemblies. On the left end of one of these assemblies is an inverted "U" bracket of red anodized aluminum. Remove the three hex-head screws and the bracket holding this assembly to the bar (See Figure 4-2 below).

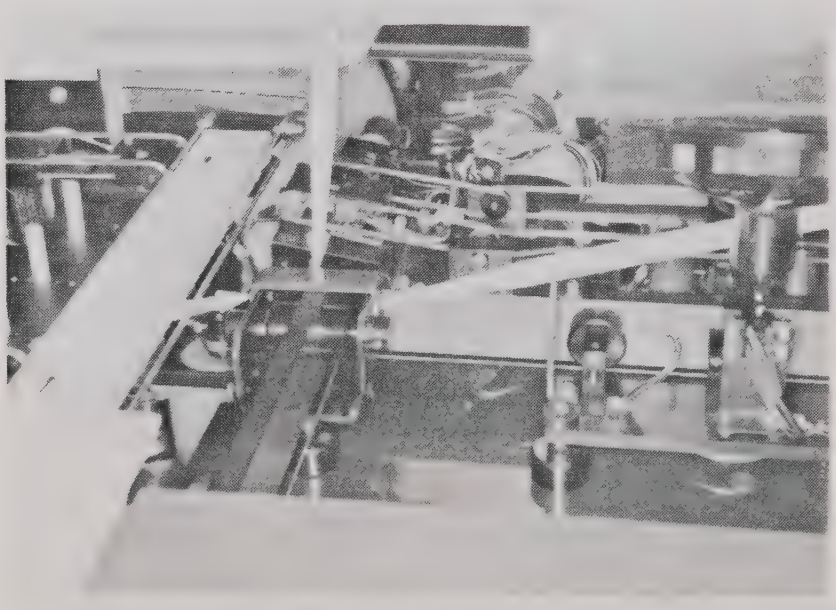


Figure 4-2

Moving to the right, two red anodized aluminum brackets should be apparent on both sides of the second mechanical assembly mentioned above (See Figure 4-3). Remove the two brackets and six screws on this second assembly.

Moving further to the right, under the other end of the first assembly, should be a red anodized aluminum spacer. From the top side, remove the screw going through the center of the spacer. Remove the spacer. Reinstall the machine covers.

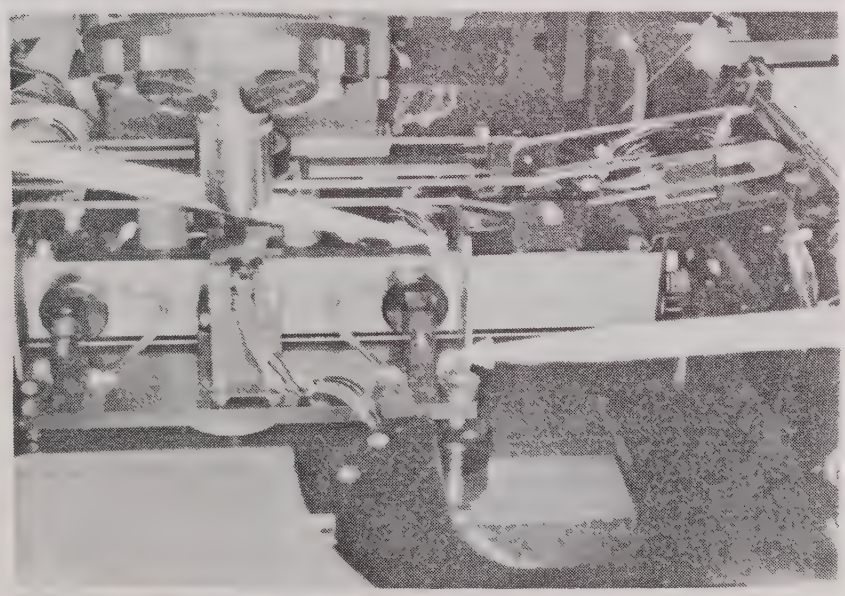


Figure 4-3

INSTALLATION

FACILITY REQUIREMENTS

Electrical: 120 VAC, 60 Hz. @ 5 Amps.
(220 VAC, 50 Hz. operation is available as an option.)

Air or Nitrogen: Dry, 80 PSIG @ 10 CFH (1/4 inch thin wall tubing required for Parker Polytight connection.)

Vacuum: 20 inches Hg. @ 5 CFH (1/4 inch thin wall tubing required for Parker Polytight connection.)

PLUMBING CONNECTIONS

Two plumbing connections are required for system operation - compressed air or nitrogen and vacuum. The inputs are clearly labeled and located on the back panel of the inspection station. They both utilize 1/4 inch thin wall tubing terminating in a Parker Polytight 1/4 inch connection (See Figure 4-4).

> NOTE: AN AIR FILTER IS SUPPLIED WITH EACH INSTRUMENT AND SHOULD BE USED IN LINE WITH A COMPRESSED AIR SOURCE.

Complete the two plumbing connections to the specified facility supplies.

A separate air or nitrogen connection must be made to the vibration isolation table. This is most easily done by connecting the table to the inspection station's air supply with a T-fitting. A length of tubing is tie-wrapped to the bottom table surface. Connect the table to the facility side of the filter.

SYSTEM ELECTRICAL CONNECTIONS (See Figure 4-4)

The system is fitted with a six foot power cord terminating in a three prong plug compatible with standard 120 VAC, 60 Hz. outlets. Verify that the toggle switch on the front panel of the electrical chassis assembly is in the down position. Cut the tie wrap to the power cord on the back panel of the electrical chassis assembly and plug it into an appropriate outlet.

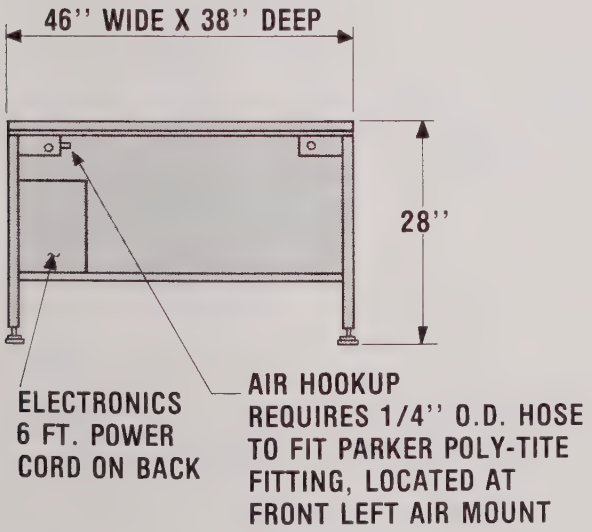


Figure 4-4 Plumbing/Electrical Connections

KEYPAD INSTALLATION

The keypad has been shipped in a separate package so that it, like the binocular head, may be better protected. The installation procedure is as follows:

1. Identify the keypad harness located on the bottom of the instrument and feed it out as shown in the diagram.

2. Remove the protective wrap from the keypad.

3. Insert the harness connector into the keypad connector as shown in figure 4-5 below. The keypad may be placed on either the right or left side of the operator console.

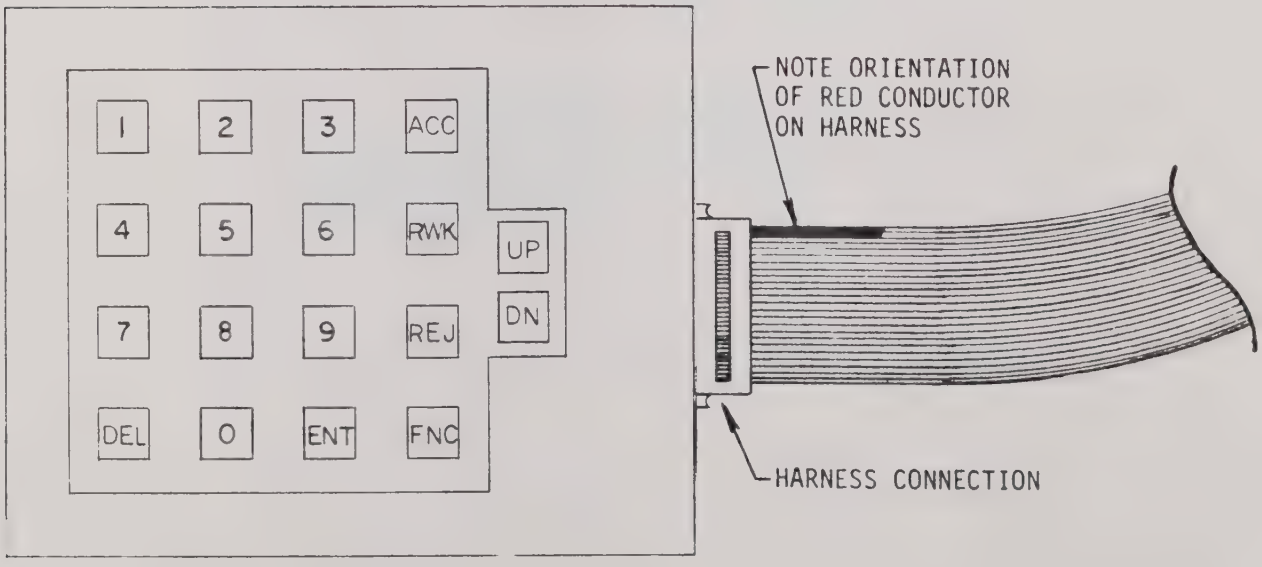


Figure 4-5 Keypad Connection

INSTALLATION

OPTICS INSTALLATION

The Binocular or Trinocular head has been shipped with the Wafer Inspection System in a separate carton to minimize the possibility of damage. Figure 4-6 below shows the location of the screw on the microscope that is used to secure the head. The procedure used to attach the head to the microscope is as follows:

1. Loosen the set screw on the microscope binocular head retention assembly.

2. Mount the binocular or trinolcular head onto the retention assembly and secure it with the set screw.

3. Loosen the eyepiece set screws, shown in Figure 4-6 below, and insert the eyepieces into the head. Secure the eyepieces with the screws.

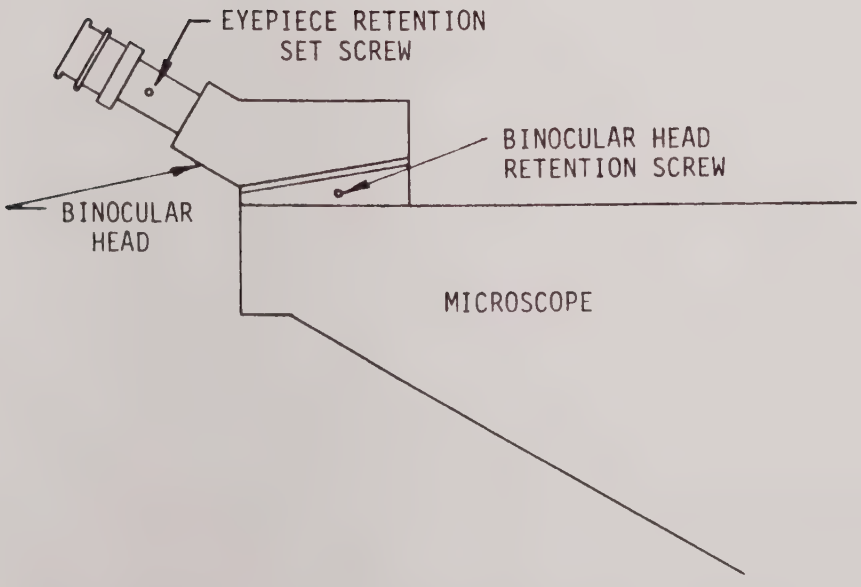


Figure 4-6 Binocular head set screws

PRE-OPERATION

Section 5

PRE-OPERATION SAFETY

Those adjustments and procedures provided in the Service Section of this manual are to be performed only by factory trained service personnel familiar with laser safety procedures. Under no circumstances should the microscope cover be removed except for service by factory trained service presonnel. Its removal is not required for normal operation or maintenance.

This system has been determined to be and is protected as a Class II Laser Light Product. The warning below is repoduced as required by Bureau of Radiological Health Title 21, CFR 1040.1. Figure 5-1 shows the laser path in the microscope. THIS IS FOR REFERENCE PURPOSES ONLY.

> **CAUTION**
>
> Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous Laser Light Exposure.

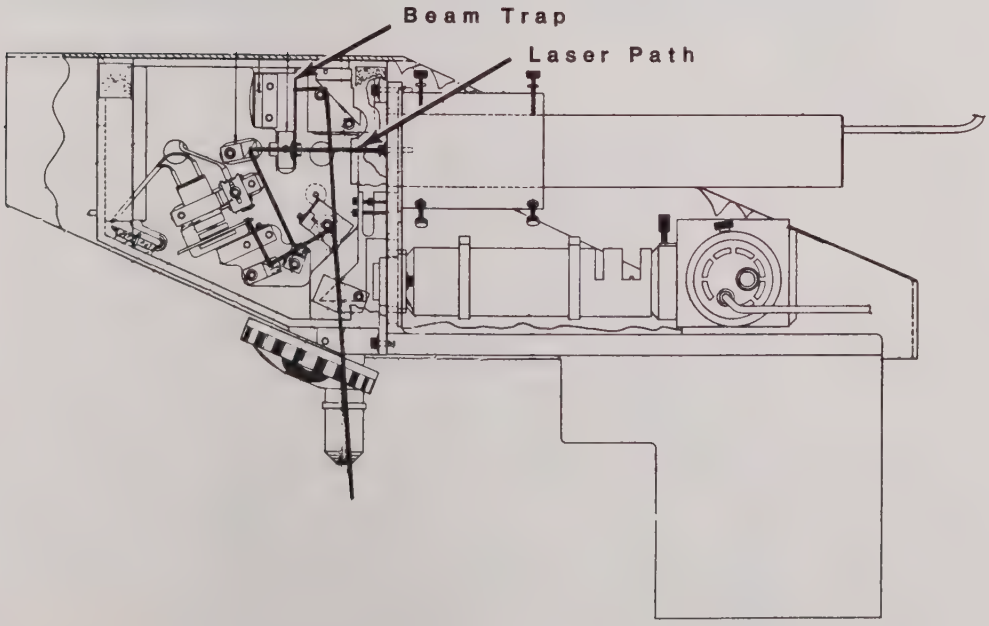


Figure 5-1 Laser Path

PRE-OPERATION

There are several locations within the Electrical Chassis Assembly where high voltage may be encountered (See Figure 5-2). These are: the electrical terminal strip on the inside back panel and the terminal strip directly behind the PCB card cage; exposed connections on the power supply transformers and line filter; and the laser plug on the back panel. NOTE: THE COVER TO THE ELECTRICAL CHASSIS ASSEMBLY SHOULD NOT BE REMOVED EXCEPT BY FACTORY-TRAINED SERVICE PERSONNEL

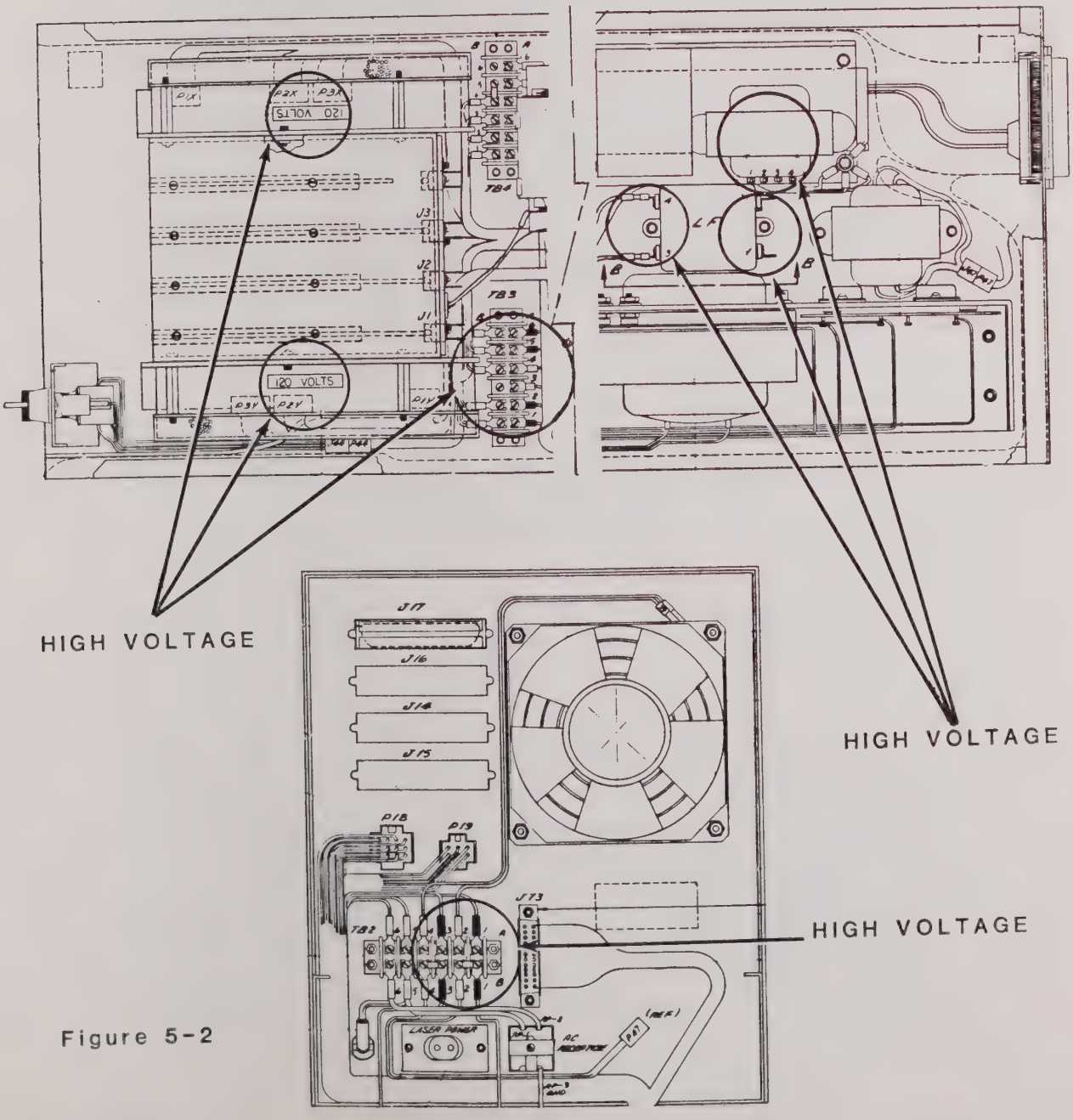


Figure 5-2

PRE-OPERATION SET-UP

After verifying that external connections have been correctly made, turn the power "on" using the switch located on the front panel of the electrical chassis assembly.

When the unit is turned on, all four indexers will move to their uppermost travel limit. Load all four indexers with empty wafer cassettes. The Input Indexer will index to the bottom of its travel and then back to its uppermost limit. The three receiving indexers will index to the bottom of their travel and stop. Rotate a microscope objective into the optical path and verify that the Autofocus Laser is functioning by placing a white card beneath the objective. If the laser is operating, a red laser light will be observed on the card.

> CAUTION
> DO NOT place a tipped reflecting surface below the objective, or stare into the beam.

PRE-OPERATION

PRE-OPERATION CHECK-OUT

To start up the Inspection Station after power has been removed or on installation, use the following procedure:

1. Verify that Air and Vacuum are at the required levels as shown on the dial indicators in the right rear of the Inspection Station.

2. Turn on system power with the power switch located on the front panel of the electrical chassis assembly. Verify that the Red Power indicator is "on."

3. Note that all four Indexers rise to the top position.

4. Place all empty cassettes on the three (Accept, Rework and Reject) Output Indexers. The indexer platforms will then move to their lower limit of travel.

5. Place a cassette with wafers to be inspected on the Input Indexer. The indexer should lower until it encounters the bottom wafer.

6. When the Inspect menu is entered from the main menu, the bottom wafer will feed out of the Input Indexer onto the Transfer Plate and prealign to the major flat or notch.

7. In the Inspect menu, the wafer will transfer, following prealign, to the X-stage chuck. A second wafer will feed to the transfer plate for prealigning.

8. The wafer may be moved under the microscope objective for inspection using the joystick located under the control console. If the wafer is not in focus, continue to the next step; if it is, skip to step 10.

9. The first wafer to be inspected after powering up the inspection station will require the operator to perform a Coarse Focus to bring the wafer into the range of the Autofocus. This is done by pressing "Focus" (Coarse Focus Control) in the Inspect menu. This operator action may be performed whenever the wafer is not in focus.

10. The joystick may be used to fine-position the wafer under the viewing objective.

11. On completion of inspection, the wafer may be transported to the selected output cassette by pressing the desired indexer key on the keypad: "ACC" for Accept, "REW" for Rework and "REJ" for Reject.

12. After a wafer has been selected for transport to the Receive Indexers, the prealigned wafer in position on the Transfer Plate will transfer to the X-stage.

13. Cycle the remaining wafers in Receive Indexers.

14. This completes the Pre-operation Check-out.

PRE-OPERATION PROGRAMMING PROCEDURE

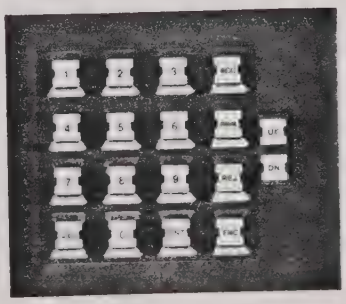
In addition to the manual wafer inspection capability described in Pre-operation Checkout, the MV-15 contains a software package which enables the user to create specific wafer inspection programs for implementation during system operation. The following step-by-step procedure is provided as a guide for developing these programs. The procedure includes descriptions of the area scan and jump capabilities which may be programmed into the system. Reference is also made to AUTO UPLOAD, a SECS communication data output mode which is optional and utilizes a host computer.

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
TO POWER UP/INITIALIZE THE SYSTEM	
Power up the system (see Pre-operation Set-up).	o VERSION #4 REV A o o MEMORY RETAINED (LOST) o
If the memory has been retained, wait 4 seconds for the Main Menu. If the memory is lost, press any key.	o SETUP INPUT/OUTPUT o o INSPECT DIAG o (Main Menu)
********** NOTE: If the Main Menu is not displayed, check to ensure that the system is operational and press the keypad FNC (Function) key (See Figure 5-8) to call up the Main Menu. **********	

KEYPAD ABBREVIATIONS

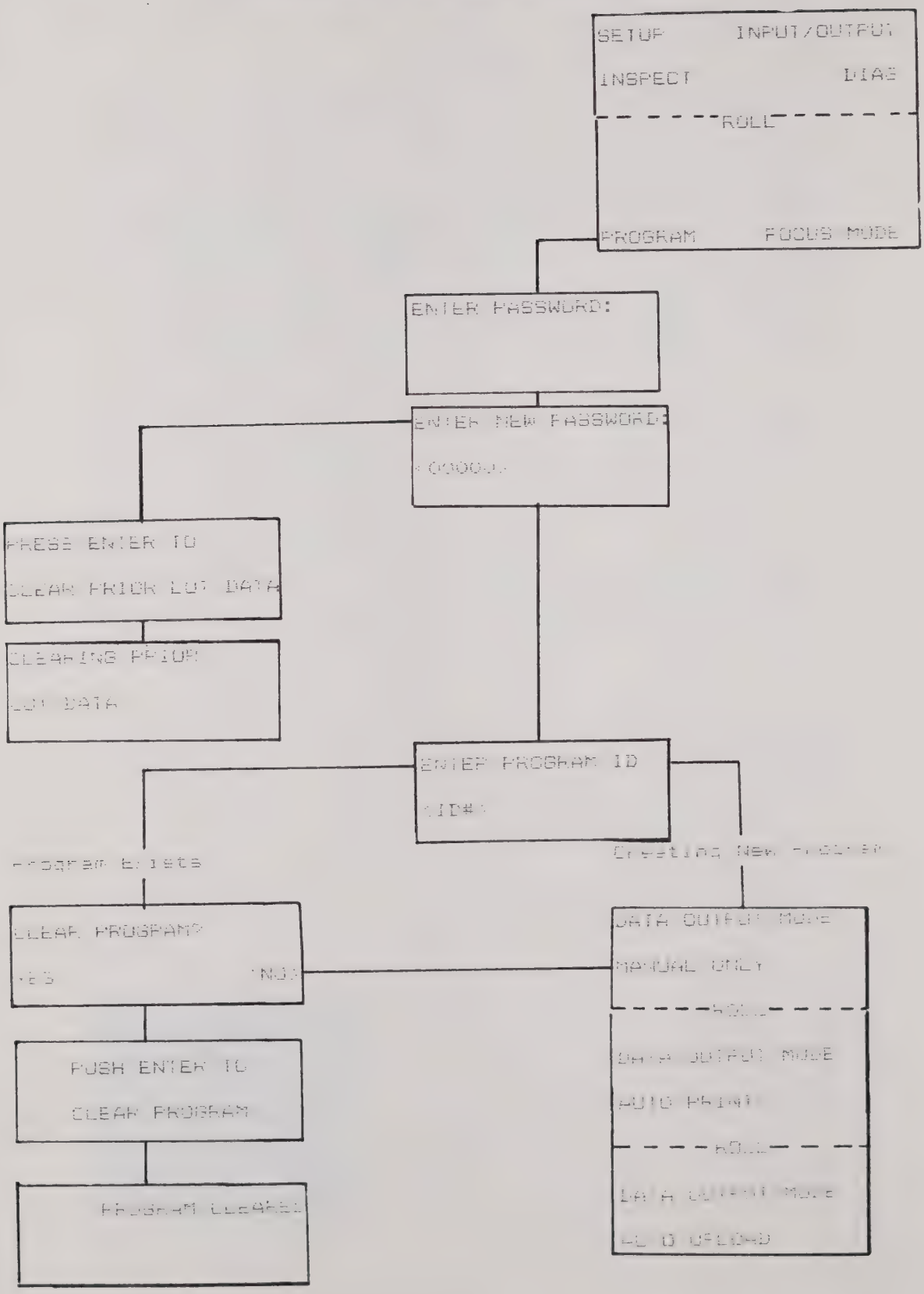
ACC = Accept
DEL = Delete
ENT = Enter
FNC*= Function
REJ = Reject
RWK = Rework

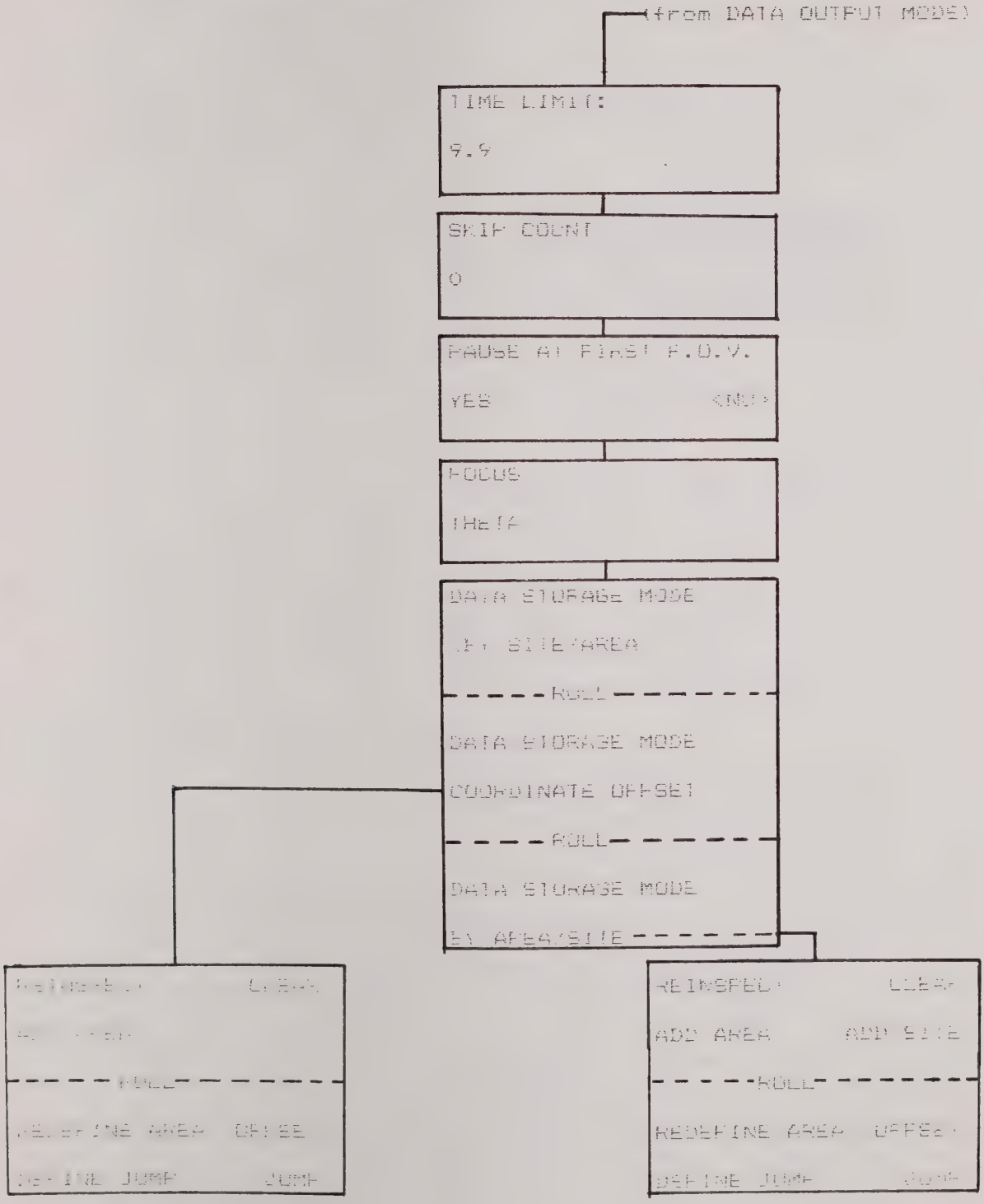
*May also be labeled "MAIN MENU."



Keypad

MV-15 SOFTWARE PROGRAMMING MENU TREE




(from DATA OUTPUT MODE)
TIME LIMIT:
9.9
SKIP COUNT
0
PAUSE AT FIRST P.O.V.
YES
<NO>
FOCUS
INFTY
DATA STORAGE MODE
BY SITE/AREA
ROLL
DATA STORAGE MODE
COORDINATE OFFSET
ROLL
DATA STORAGE MODE
BY AREA/SITE
REINSPEC:
CLEAR
ADD AREA
ADD SITE
ROLL
REDEFINE AREA
DEFINE JUMP
JUMP

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
Press the "Roll" button on the control console (see Figure 5-9) to access the second page of the Main Menu.	o PROGRAM FOCUS MODE o (Second page of Main Menu)

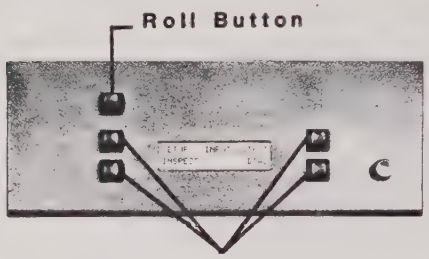


Figure 5-9 console buttons

****
NOTE: The keypad FNC (Function) key may be pressed at any point to return to the Main Menu. Other displayed menus may be selected by pressing adjacent console buttons. The second page of any menu (if it exists) may be accessed by using the "Roll" button.
****

Press the console button adjacent to "Program" on the second page of the Main Menu to begin programming specific inspection requirements.	o ENTER PASSWORD: o
TO ENTER THE PASSWORD	
Enter the password programmed into each new machine by pressing the "0" key on the keypad five times (the password is "00000"); then press the ENT (Enter) key.	o ENTER NEW PASSWORD: o o <00000> o

****
NOTE: If an incorrect password was entered, the system will return to the Main Menu.
****

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
If a new password is required, enter it using the keypad numeric keys when ENTER NEW PASSWORD is displayed; then press the ENT (Enter) key.	o PRESS ENTER TO o o CLEAR PRIOR LOT DATA o
********** NOTE: The programmed password must be entered before a new password may be established. To prevent future program entry problems, write down any new passwords. **********	
Press the ENT (Enter) key to clear prior lot data.	o CLEARING PRIOR o o LOT DATA o
********** NOTE: Accumulated lot data must be cleared before a new password or program ID number will be accepted by the system. See "Clearing Prior Lot Data" in the Operation section of this manual for instructions on preventing accidental loss of data where lot data output is not automatic. **********	
TO ENTER THE PROGRAM ID	
Press the ENT (Enter) key to retain the current program identification number. To establish a new number, enter the new digits on the keypad numeric keys and press the ENT (Enter) key (see above NOTE relating to the clearing of prior lot data).	o ENTER PROGRAM ID o o <Current ID#> o
********** NOTE: A program ID number must be used. A screen stating TOO MANY PROGRAMS is displayed when more than 16 program entries are attempted. After 2 seconds, the system returns to the Main Menu. **********	

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
	o CLEAR PROGRAM? o o YES <-<NO> o
	(If program already exists)
	OR
	o DATA OUTPUT MODE o o MANUAL ONLY o
	(If creating a new program)
TO CLEAR A PROGRAM	
Press the console button adjacent to YES on the CLEAR PROGRAM display.	o PUSH ENTER TO o o CLEAR PROGRAM o
Press the ENT (Enter) key.	o PROGRAM CLEARED o o o
Repeat the process outlined above to clear other programs.	o CLEAR PROGRAM? o o YES <NO> o
TO KEEP PROGRAMS	
Press the NO button or ENT (Enter) key to keep a program and advance the system to the first of three data output modes.	o DATA OUTPUT MODE: o o MANUAL ONLY o

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
********** NOTE: The MANUAL ONLY display appears first if no other mode has been selected. **********	
TO SET THE DATA OUTPUT MODE	
Press the "Roll" button to view each of the two remaining data output modes.	o DATA OUTPUT MODE: o o AUTO PRINT o o DATA OUTPUT MODE: o o AUTO UPLOAD o
********** NOTE: Each time the operator changes lot or program ID numbers, accumulated lot data must be output or it will be lost. The three modes that may be programmed to output the data are differentiated as follows: MANUAL ONLY mode is used if accumulated lot data is to be manually output from the Input/Output menu. AUTO PRINT mode is used for automatic printout of accumulated lot data. AUTO UPLOAD mode is used for automatic uploading of accumulated lot data to a host computer. **********	
When the desired output mode is displayed, press the ENT (Enter) key to record your choice and to advance the system to the TIME LIMIT display.	o TIME LIMIT: o o 9.9 o

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
TO SET A TIME LIMIT Press a 2-digit number (0.1 to 9.8 or 9.9) to specify the duration (time limit) of each inspection. Decimal point entry in automatic.	o TIME LIMIT: o o 1.2 o
********** NOTE: A value of 9.9 appears on the TIME LIMIT display by default when the system is powered up or if no other value has been entered. With a 9.9 value in the program, the ENT (Enter) key must be pressed at each location--no location change is automatic. Entered values of 0.1 to 9.8 specify the inspection duration (in seconds) at each location; subsequent location changes are automatic. **********	
Press the ENT (Enter) key to record the TIME LIMIT and advance the system to the next display.	o SKIP COUNT o o 0 o
TO ESTABLISH A SKIP COUNT Press the numerical key (0 - 9) representing the number of wafers to be "skipped" (not inspected).	o SKIP COUNT o o 3 o
********** NOTE: The "skip" capability allows a number of wafers to be bypassed when the process does not require that each wafer be inspected. **********	

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
Press the ENT (Enter) key to record the SKIP COUNT selection and advance to the next display.	o PAUSE AT FIRST F.O.V.? o o YES <NO> o
Press the YES button to provide an automatic "pause" for operator adjustments at the first field of view. Push the NO button to allow the process to be manually interrupted by the operator if necessary.	
********** NOTE: A "pause," when programmed, causes the inspection stage to stop at the first field of view (F.O.V.) so that the operator may make any required Focus, Theta, or XY Offset adjustments. **********	o WAFER REQUIRED ON o o STAGE TO CONTINUE o
********** NOTE: If a wafer is not already on the X-stage chuck, the system will display WAFER REQUIRED ON STAGE TO CONTINUE. In that case, refer to the Pre-operation Checkout section of this manual and follow the steps required to transfer a wafer to the stage and position it under the microscope objectives. **********	
TO ADJUST FOCUS AND THETA	o PUSH ENTER WHEN DONE o o WITH FOCUS AND THETA o
Wait 2 seconds and double check to ensure that a wafer is present under the microscope objective before continuing.	o FOCUS o o THETA o

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
If a coarse focus is required, press the console button adjacent to FOCUS.	o FOCUS IN PROGRESS o
	FOLLOWED BY
Wait for the system to complete a coarse focus.	o FOCUS COMPLETED o
	OR
	o FOCUS FAILURE o
********** NOTE: When focus fails, use the joystick control to slightly offset the position of the wafer on the stage and press the FOCUS button to try again. Continuing focus problems should be referred to OSI field service. **********	
	o FOCUS o o THETA o
To adjust Theta, press the THETA console button.	o THETA ENABLED o
Wait 2 seconds	o REMAIN ENABLED o o DISABLE o
Press the appropriate console button to allow THETA to remain enabled or disable THETA.	o FOCUS o o THETA o

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
********** NOTE: THETA must remain enabled to allow the programmer to make continuous rotational alignments while programming. **********	
Press the ENT (Enter) key to advance to the next display.	o DATA STORAGE MODE o o <BY AREA/SITE> o
********** NOTE: If the data storage mode has already been established, the system will skip the process for setting the data storage mode and display the menu which reflects the data storage mode selected. **********	
TO SET THE DATA STORAGE MODE	
Press the control console "Roll" button to view the two alternative data storage modes (see NOTE).	o DATA STORAGE MODE o o COORDINATE OFFSET o
	o DATA STORAGE MODE o o BY AREA/SITE o
********** NOTE: The COORDINATE OFFSET data storage mode allows defects to be stored as XY coordinates in reference to the upper left-hand corner of their respective areas. The AREA/SITE data storage mode allows defects to be stored by site or by first field of view (upper left-hand corner) in an area (see Figure 5-10). **********	

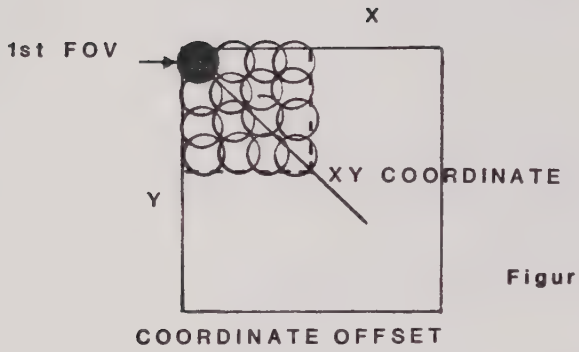
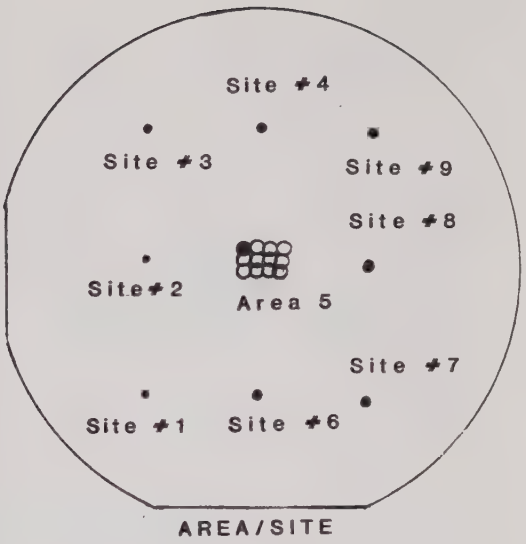


Figure 5-10



PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
When the desired storage mode is displayed, press the ENT (Enter) key to record your choice.	o REINSPECT CLEAR o o ADD AREA o (Coordinate Offset Data Storage Mode) OR o REINSPECT CLEAR o o ADD AREA ADD SITE o (Area/Site Data Storage Mode)
TO ADD A SITE Move the stage to a selected inspection site and press the console button adjacent to ADD SITE to enter it into the program.	o ADDED SITE #__ o o RENUMBERING ... o

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:

****

NOTE: The display for an added site, area, or marker will show "RENUMBERING..." while the addition is being inserted into its proper sequential order. First or last additions will not require renumbering.

PROGRAM FULL will be displayed when the maximum number of areas/sites have been entered. The maximum number is 64 areas/sites per program and 256 for the total bank of programs.

****

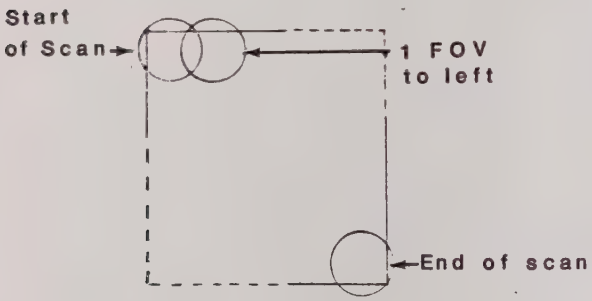


Figure 5-11 Area Scan

TO ADD AN AREA

When adding the first area, move the stage to the start of the area scan and press the button adjacent to ADD AREA to establish the starting point (see Figure 5-11).

o MOVE STAGE LEFT ONE	o
o F.O.V. & PUSH ENTER	o

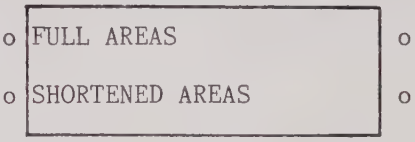
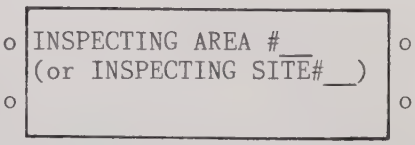
****

NOTE: The system will only show the stage movement displays (MOVE STAGE LEFT ONE F.O.V. and MOVE STAGE TO END OF SCAN) when the first area is established. Subsequent areas retain the same area configuration.

****

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
Move the stage to the left until the right edge of the first F.O.V. is reached. ********** NOTE: When moving the stage left, movement in the Y direction is disabled to prevent stage movement error. If the stage has not been moved correctly, the system will display: STAGE MOVEMENT ERROR PUSH ENTER TO RETRY. When the stage has been correctly moved, the system will automatically adjust the distance between F.O.V.'s to provide an overlap, thereby assuring a 100% area inspection capability. **********	
Push the ENT (Enter) key.	o MOVE STAGE TO END o o OF SCAN & PUSH ENTER o
Continue to move the stage left until all required X axis F.O.V.'s have been scanned. Then move the stage in the Y direction until all necessary F.O.V.'s have been covered. (A diagonal movement from the start of the scan to the lower right-hand corner of the area may be substituted for the preceding X/Y movement.)	
Push the ENT (Enter) key at the end point (lower right-hand corner) of the scan to define/store the area to be scanned and return to the menu.	o REINSPECT CLEAR o o ADD AREA o OR o REINSPECT CLEAR o o ADD AREA ADD SITE o

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
Add other areas by moving the stage to the start of the next area and pressing the button adjacent to ADD AREA. (Refer to "TO REDEFINE AN AREA" in this section if area configuration must be changed.)	o ADDED AREA # o o RENUMBERING ... o
********** NOTE: The ADD AREA display will not state: "RENUMBERING ..." when the first area or site is entered. **********	
	o REINSPECT CLEAR o o ADD AREA o
	OR
	o REINSPECT CLEAR o o ADD AREA ADD SITE o
TO CLEAR AN AREA OR SITE	
Press the console button adjacent to CLEAR for each area/site to be deleted.	o AREA CLEARED o o RENUMBERING ... o
	OR
	o SITE CLEARED o o RENUMBERING ... o
********** NOTE: When all areas/sites have been cleared, NO SITES TO CLEAR will be displayed. **********	

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
TO REINSPECT	
	OR
Press the console button adjacent to REINSPECT to return to the first field of view (F.O.V.) and review the programmed inspection process.	
********** NOTE: When reinspecting the programmed inspection locations, the keypad send (disposition) keys which enable the operator to disposition inspected wafers to the Output indexers are disabled. It will, therefore, be necessary to press the FNC (Function) key to return to the Main Menu and then press the INSPECT button to enable the ACC (Accept), REJ (Reject) and RWK (Rework) keys. The on-stage wafer may then be dispositioned. **********	
Select either full or shortened areas for reinspection and press the appropriate console button to implement the program.	

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
********** NOTE: Full areas include all fields of view (F.O.V.'s) in each area. Shortened areas include only the first F.O.V. (upper left-hand corner) in each area. Shortened areas are particularly useful when it is desired to move from area to area without covering all F.O.V.'s. **********	
Wait 2 seconds after all areas and sites have been alternately inspected and PATTERN COMPLETED has been displayed.	o REINSPECT CLEAR o o ADD AREA o OR o REINSPECT CLEAR o o ADD AREA ADD SITE o
********** NOTE: If a 9.9 time limit has been programmed, the ENT (Enter) key must be pressed to move the stage from one F.O.V. to the next. **********	
TO MAKE SYSTEM ADJUSTMENTS FOLLOWING REINSPECTION Press the control console "Roll" button to access the second page of the menu.	o REDEFINE AREA OFFSET o o DEFINE JUMP JUMP o
TO REDEFINE AN AREA If it is necessary to redefine area configuration, press the button adjacent to REDEFINE AREA. Then, move the stage to the start of the area scan and push the ENT (Enter) key. This will return the system to the ADD AREA sequence.	o MOVE STAGE TO START o o OF SCAN & PUSH ENTER o

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
TO SET OR CLEAR AN XY OFFSET	The system displays:
Press the OFFSET button to clear or set an offset if it is necessary to compensate for a directionally-skewed wafer observed during the reinspection process. Use the joystick shaft to make an XY offset alignment (see Figure 5-12) and press the SET OFFSET button. Delete the offset by pushing the CLEAR OFFSET button.	o REDEFINE AREA OFFSET o o DEFINE JUMP JUMP o o SET OFFSET o o CLEAR OFFSET o

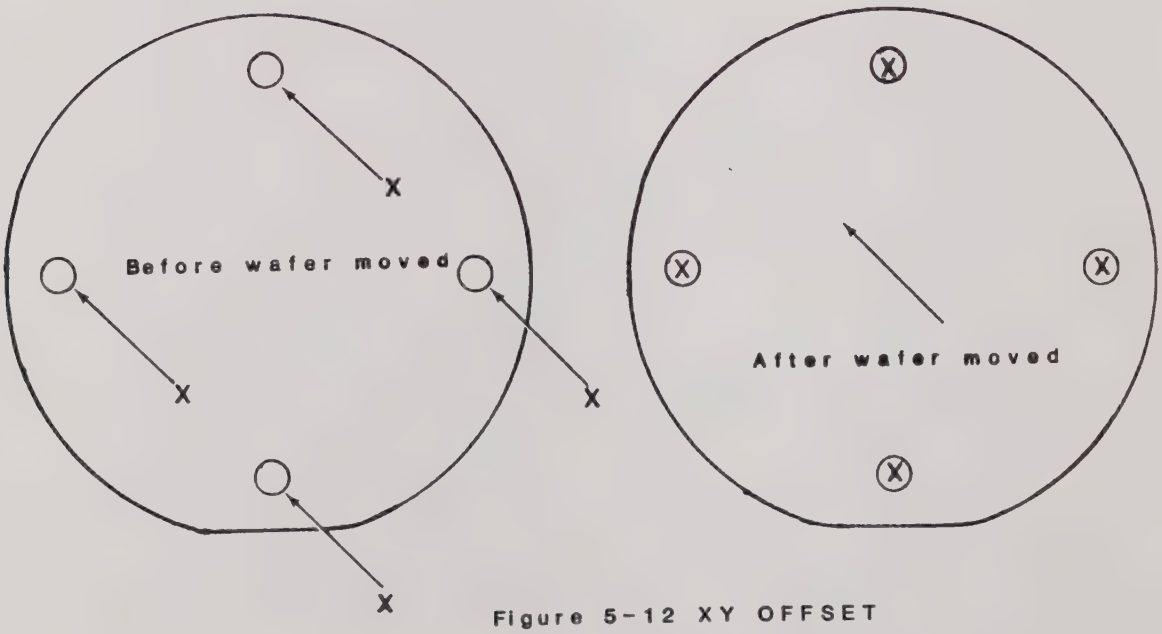
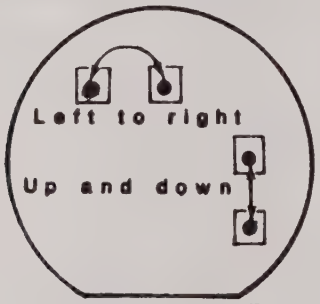


Figure 5-12 XY OFFSET

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
TO DEFINE AND EXECUTE A JUMP	o REDEFINE AREA OFFSET o o DEFINE JUMP JUMP o
********** NOTE: The jump capability allows the operator to make equidistant jumps in X, Y or diagonal directions. This capability to jump from one location to another facilitates die to die verification of repetitive defects resulting from multiple reticle imaging on a wafer (see Figure 5-13). **********	
 Figure 5-13 JUMP	
Press the console button adjacent to DEFINE JUMP.	o MOVE STAGE TO START o o OF JUMP & PUSH ENTER o
Move the stage to the starting point of the jump and press the ENT (Enter) key.	o MOVE STAGE TO END o o OF JUMP & PUSH ENTER o
Move the stage in an X, Y, or diagonal direction to the point where the jump will end and press the ENT (Enter) key.	o REDEFINE AREA OFFSET o o DEFINE JUMP JUMP o

PROGRAMMING STEPS	SYSTEM RESPONSE/DISPLAY
	The system displays:
Press the console button adjacent to JUMP.	o LEFT DOWN o o RIGHT UP o
Press the console buttons which reflect the direction(s) of the jump to execute the movement.	
********** NOTE: Any buttons which do not reflect the direction of the programmed jump will be disabled during its execution. **********	
Press the ENT (Enter) key to return to the menu.	o REDEFINE AREA OFFSET o o DEFINE JUMP JUMP o

THE PROGRAMMING PROCEDURES FOR THE MV-15 ARE NOW COMPLETED. REFER TO THE OPERATION SECTION OF THIS MANUAL FOR OPERATING INSTRUCTIONS.

SYSTEM OPERATION

Section 6

MV-15 OPERATION REFERENCE GUIDE

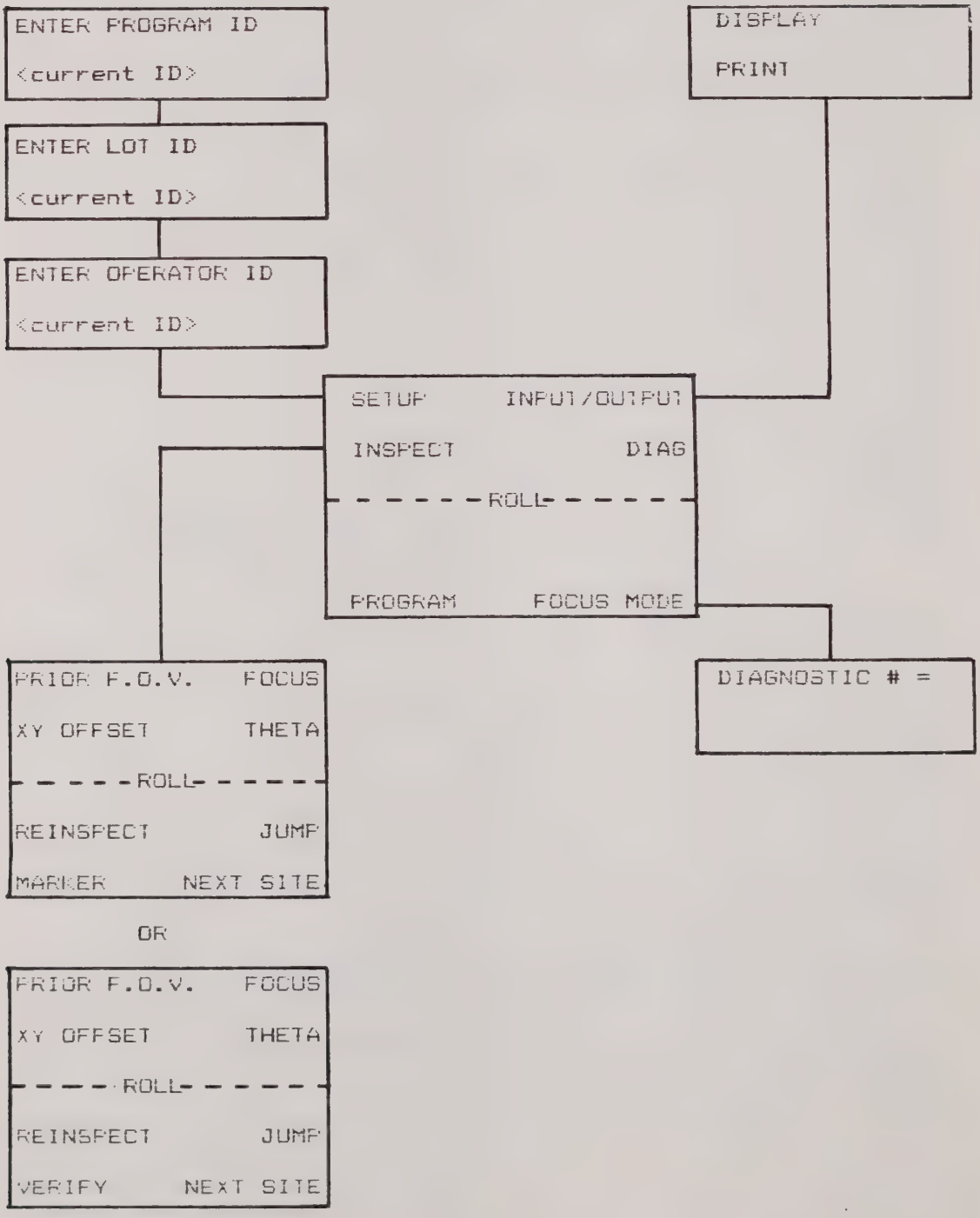
BASIC OPERATION

VERIFY	that Air & Vacuum are at required levels
SWITCH	power ON
LOAD	four cassettes (send indexer with full cassette; others empty)
RESET	indexers by realigning cassette crossbars to index plate slots
WAIT	until indexers complete their travel
VERIFY	that Autofocus Laser is functioning
PRESS	FNC (Function) key to access Main Menu
POSITION	wafer using the joystick
PERFORM	a coarse focus
ACCESS	INSPECT menu to inspect a wafer
SEND	inspected wafer to an output (receive) indexer using the ACC (Accept), RWK (Rework), or REJ (Reject) keys.

OPERATING SOFTWARE MODES

MAIN MENU (first page)	Starting point; lists menu options
(second page)	PROGRAM and FOCUS modes
SETUP	Enters or changes PROGRAM, LOT or OPERATOR ID #
INSPECT (first page)	Wafer inspection; PRIOR F.O.V. inspection; FOCUS, THETA and XY OFFSET adjustments
(second page)	REINSPECTION; NEXT SITE inspection; JUMP execution; MARKER establishment; defect data verification
INPUT/OUTPUT	Prints/displays LOT DATA & PROGRAM ID's
DIAG	Accesses system diagnostics

MV-15 SOFTWARE OPERATION MENU TREE



SYSTEM OPERATION

If your MV-15 has been recently purchased, read the installation section of this manual and verify that the system has been completely unpacked, its contents adequately inspected and all installation instructions followed.

If the MV-15 is functionally operational, power-up and initialize the system following the set-up and check-out procedures in the Pre-operation section.

After power-up and initialization, the system may be programmed as outlined in the Pre-operation section.

When the above steps have been completed, the system may be operated using the information provided in the following pages.

BASIC OPERATING INFORMATION

Using the MV-15 Control Console and Keypad

The keypad keys and control console buttons are used to operate the system.

The keypad (see Figure 6-1) is used to enter commands and data into the system. Using the keypad, the operator may enter or delete numbers, perform a manual focus (see "FOCUS MODE"), make inspection defect entries (see "DEFECT ENTRY") and disposition (send) inspected wafers for acceptance, rework or rejection (see "WAFER DISPOSITION"). The keypad may also be used for other purposes such as accessing the Main Menu on the control console display panel.

The control console buttons (see Figure 6-2) are used to access menus and select menu options (see "Accessing System Menus and Menu Options") from the 40-character liquid crystal display (LCD) panel. The joystick control located under the console (see "Using the Joystick Control") is used to manually position on-stage wafers. Other console components include an illuminator brightness control and a laser emission (power ON) indicator.

Both the keypad and control console are required to develop wafer inspection programs and perform wafer inspections. Descriptions of the keypad and control console are contained in the System Description section.

KEYPAD
ABBREVIATIONS

ACC = Accept
DEL = Delete
ENT = Enter
FNC* = Function
REJ = Reject
RWK = Rework

* May also be labeled "MAIN MENU."

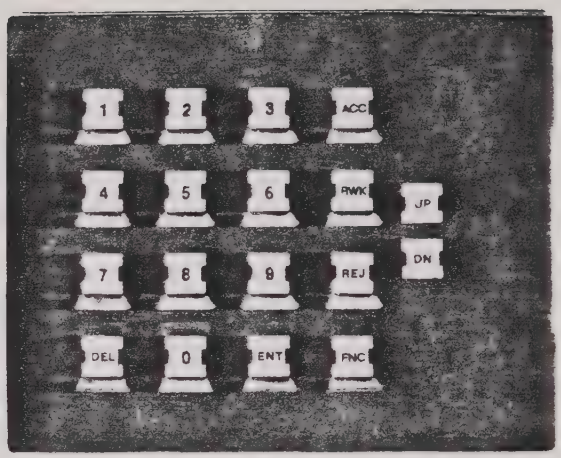


Figure 6-1 Keypad

Accessing System Menus and Menu Options

Pressing the FNC (Function) key on the keypad will cause the system to display the Main Menu. The Main Menu (displayed in Figure 6-2) is a list of options that serves as the starting point for system operation.

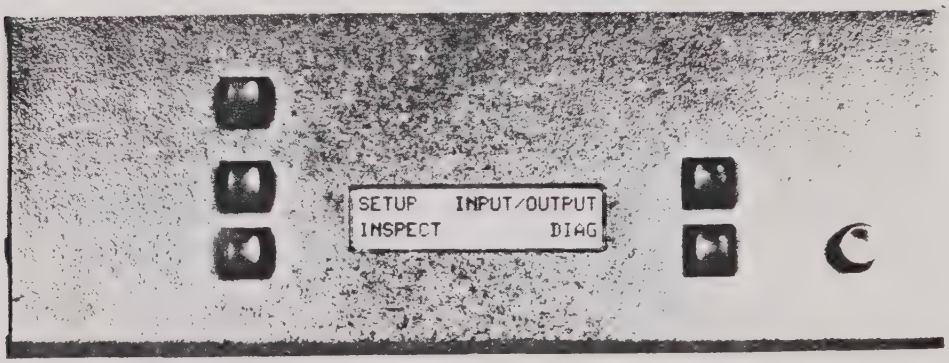


Figure 6-2 Control Console displaying Main Menu

The four (4) buttons located to the left and right of the control console display panel are used to implement menu functions shown on the display. The "Roll" button is located above the the two control console buttons on the left-hand side of the display screen. It is used to move between the pages of a displayed menu if more than one page exists.

Using the Joystick Control

The joystick control is located below the control console (see Figure 6-3). When the control is enabled, the joystick shaft is used to manually position an on-stage wafer in the XY axis and the joystick handle is used to rotate the wafer in a THETA (clockwise or counter-clockwise) direction.

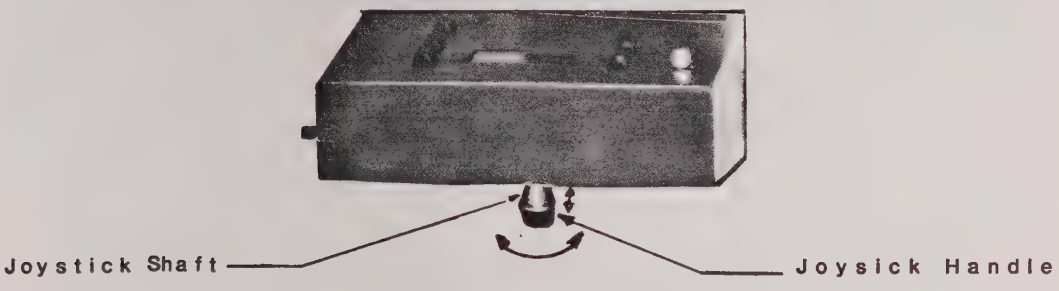


Figure 6-3 Joystick

SYSTEM SETUP

The SETUP option on the Main Menu is used to enter or change program, operator and lot identification numbers.

Entering the Program ID Number

1. With the Main Menu displayed, push the button located next to SETUP on the control console. The system will respond by requesting that a program identification number be entered:

```
ENTER PROGRAM ID

<current ID #>
```

****

COMMENT: The identification number (if any) currently in use will be displayed between the brackets in the lower left-hand corner of the display screen. The space between brackets on the display will be blank if no programs exist in the system or if the previously selected program has just been deleted using the PROGRAM mode on the second page of the Main Menu (the programming procedure is explained in the Pre-operation section of this manual).

****

2. Press the ENT (Enter) key on the keypad to continue use of the current program OR enter a new program identification number (see NOTE) from those stored in the program memory and then press ENT (Enter).

****

NOTE: The keypad numeric keys are used to enter program identification numbers. The DEL (Delete) key is used to eliminate digits which have been incorrectly entered.

****

3. If a new program identification number was entered, but the new number is not stored in the program memory, the console screen will display:

PROGRAM NOT PRESENT
<new ID#>

... and then return to the Main Menu.

****

CORRECTIVE ACTION: To determine what programs are stored, refer to "Displaying Stored Program IDs" in the latter part of this section. If one of the stored programs can be used, press the FNC (Function) key to return to the Main Menu, and repeat steps 1 and 2 above. If a new program identification number is required to create a new program, press the FNC (Function) key to return to the Main Menu. Then push the "Roll" button to access the second page of the menu. FOLLOW PROGRAMMING PROCEDURES OUTLINED IN THE PRE-OPERATION SECTION TO PROGRAM THE NEW IDENTIFICATION NUMBER INTO THE SYSTEM. After the new program has been stored in the system, return to the Main Menu and repeat steps 1 and 2 above.

****

Clearing Prior Lot Data

If a new program or lot identification number is entered, prior lot data is output and cleared automatically in either the AUTO PRINT or AUTO UPLOAD data output modes. In the MANUAL ONLY data output mode, however, prior lot data must be output and cleared manually.

****

NOTE: The data output mode is established as part of the programming procedure (refer to the Pre-operation Programming section of this manual).

****

If an external printer is present, the AUTO PRINT mode, when programmed, will automatically print out, and then clear, accumulated lot data. The AUTO UPLOAD mode, if programmed, will automatically upload accumulated lot data to a host computer before clearing accumulated lot data if that option is available.

The MANUAL ONLY mode, when programmed, differs from the automatic data output modes in that the system will display:

```
PRESS ENTER TO
CLEAR PRIOR LOT DATA
```

AND, IF "ENT" IS PRESSED,

```
CLEARING PRIOR
LOT DATA
```

The purpose of the above display is to prevent accidental loss of data and to provide the operator with an opportunity to manually output the accumulated lot data before it is cleared (see "Displaying Lot Data").

In any case, however, accumulated lot data must be cleared before a new program or lot identification number will be accepted by the system.

Entering the Lot ID Number

Following, or instead of, the "clearing prior lot data" displays (if a new or different program ID# has not been entered), the display will prompt:

```
ENTER LOT ID
<current ID>
```

If a current Lot ID number is displayed, press the ENT (Enter) key to retain it, or use the keypad numerical keys to enter a new lot identification number.

Entering the Operator ID

After the lot identification number has been entered, the screen will prompt:

ENTER OPERATOR ID
<current ID>

Press the ENT (Enter) key to retain the current operator identification number, or enter a new number using the keypad numerical keys.

****

NOTE: At this point, if a wafer is not on the inspection stage, refer to the Pre-operation Checkout section of this manual. Follow the procedure outlined in that section to transport a wafer to the stage and properly position it under the microscope objective. IF A WAFER IS NOT PRESENT ON THE STAGE, INSPECT MENU COMMANDS CANNOT BE UTILIZED.

****

SYSTEM ADJUSTMENTS

If a wafer is on the inspection stage and all identification numbers have been entered (or the INSPECT option on the Main Menu has been selected), the system will display:

PRIOR FOV	FOCUS
XY OFFSET	THETA

(First Page of Inspect Menu)

With the above menu displayed, the wafer inspection process will begin unless it is interrupted to make FOCUS, THETA or XY OFFSET adjustments. In that case, the process may be manually halted by pressing any console button or it may be automatically stopped by a programmed "pause." The process may be re-started by pressing the ENT (Enter) key.

****

NOTE: If a "pause" has been programmed, the stage will stop at the first field of view (F.O.V.) to allow the operator to perform the required adjustments.

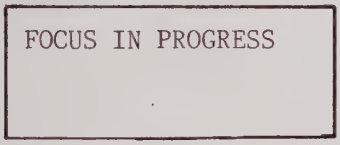
****

If the inspection process is halted, FOCUS, THETA and XY OFFSET adjustment modes may be selected from the INSPECT menu by pressing the appropriate button.

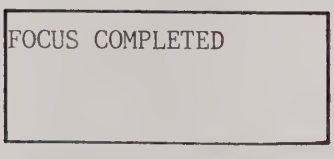
Focus Adjustment

1. If the standard Nosepiece Turret is installed, manually rotate the desired microscope objective into position in the viewing path. If the Motorized Turret option is installed, press the appropriate key on the Turret Keypad to rotate the objective into position (see "MOTORIZED TURRET OBJECTIVE OPTION").

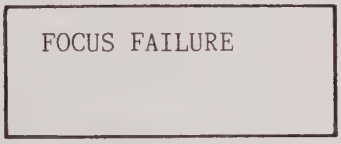
2. Press the FOCUS button on the INSPECT menu if a coarse focus is required to bring the wafer into Autofocus range (Autofocus is an OSI proprietary automatic focusing system). This will cause the coarse focus sequence to begin. During this sequence, the system will display:



FOLLOWED BY



OR

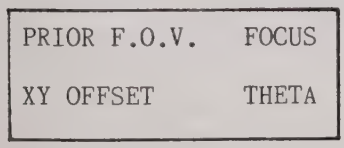


****

NOTE: Coarse focus is normally performed on the first wafer to be inspected, but may be performed at any time when a wafer is on the chuck. If focus fails, use the joystick control to slightly offset the position of the wafer and press the FOCUS button to try again. Refer continuing focus problems to OSI field service.

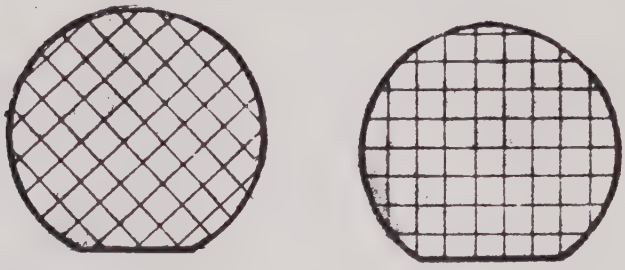
****

3. Following completion of the coarse focus, wait two seconds for the system to return to page one of the INSPECT menu:



Theta Rotational Adjustment

1. Press the THETA button to enable or disable Theta adjustments required to compensate for rotationally skewed wafer architecture (see Figure 6-4).



Before Offset After Offset

Figure 6-4

When THETA is selected, the system will first display:

THETA ENABLED

WHICH WILL CHANGE TO

REMAIN ENABLED
DISABLE

2. Press the REMAIN ENABLED button to make continuous rotational adjustments while inspecting.

3. Press the DISABLE button to use the established setting for the wafer being inspected.

****

COMMENT: To adjust the wafer rotationally in a clockwise or counter-clockwise (THETA) direction, twist the joystick handle in the same direction.

****

When THETA has been disabled or allowed to remain enabled, the INSPECT menu will re-appear:

PRIOR F.O.V.	FOCUS
XY OFFSET	THETA

XY Offset Alignment

1. Press the XY OFFSET button if it is necessary to clear or set an XY Offset. The display will prompt:

SET FOR WAFER	
SET FOR LOT	CLEAR

2. Press the CLEAR button to delete an XY Offset.

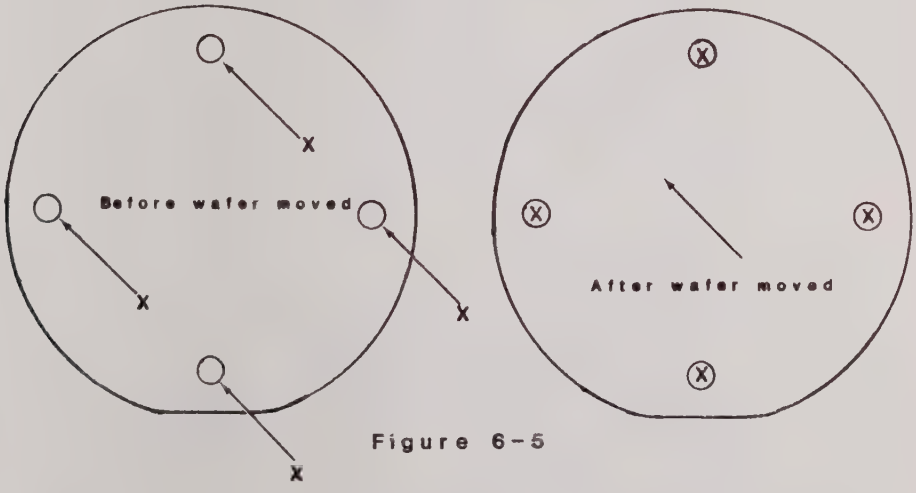


Figure 6-5

3. Use the joystick shaft to make an XY offset alignment to compensate for directionally skewed wafer architecture (see Figure 6-5).

4. Press the SET FOR WAFER button to use the established offset only for the wafer being inspected.

5. Press the SET FOR LOT button to use the established offset for the entire wafer lot under inspection.

When the XY offsets have been set/cleared, the INSPECT menu will again appear on the display screen:

PRIOR F.O.V.	FOCUS
XY OFFSET	THETA

WAFER INSPECTION

1. With all necessary adjustments completed, start or re-start the inspection process by pressing the ENT (Enter) key.

2. If no sites/areas have been programmed and no markers have been set, the system will display:

FIRST SITE

Return to the PROGRAM mode (second page of Main Menu) to program sites/areas for inspection using the programming procedure outlined in the Pre-operation section. Set temporary markers by referring to "MARKER SITES" in this section.

3. If sites/areas have been programmed and/or markers have been set, the system will display:

PRIOR F.O.V. FOCUS XY OFFSET THETA

AND

INSPECTING AREA #__

OR

INSPECTING MARKER __

OR

INSPECTING SITE # __

****

NOTE: The inspection process may be stopped at any time by pressing any console button. It may be started again by pushing the keypad ENT (Enter) key. Each area or site inspected is identified by a number signifying its sequential position in the inspection program. Each marker is identified by a letter signifying its position in relation to other markers.

****

4. When the inspection process is completed, the screen will display:

PATTERN COMPLETED

AND

PRIOR F.O.V. FOCUS XY OFFSET THETA

PRIOR F.O.V. INSPECTION

To return to any field of view (F.O.V.) in the inspection program, repeatedly push the PRIOR F.O.V. button on the INSPECT menu; the system will step backward through each prior F.O.V.

After every prior F.O.V. has been inspected, the screen will display:

FIRST F.O.V.

FOCUS MODE

1. To automatically disable Autofocus at all inspection locations, press the FNC (Function) key to return to the Main Menu:

SETUP	INPUT/OUTPUT
INSPECT	DIAG

... then push the roll button to access the second page of the Main Menu:

PROGRAM	FOCUS MODE

2. Select FOCUS MODE by pressing the adjacent console button. The system will now display:

FOCUS MODE:	WHICH MAY BE ROLLED TO	FOCUS MODE:
AUTO		MANUAL

****

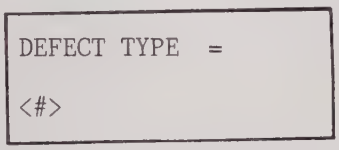
NOTE: In AUTO mode, Autofocus is always enabled. MANUAL mode may be selected when it is desired to disable Autofocus at all inspection locations. MANUAL mode permits the operator to use the joystick and keypad UP and DN (Down) keys to track manually at an inspection site. Even in MANUAL mode, however, Autofocus is enabled when traveling between inspection locations.

****

3. Press the ENT (Enter) key to select the appropriate FOCUS mode when it is displayed.

DEFECT ENTRY

When a defect is observed during the inspection process, it may be stored in system memory by selecting the appropriate pre-assigned defect category number and then pressing the corresponding numerical key and the ENT (Enter) key on the keyboard. Following defect entry, and prior to pressing the ENT (Enter) key, the screen will display:



When the defect number is entered, the system will add the entry to the accumulated total entries for that defect category. To view the accumulated totals, refer to "Displaying Lot Data" at the end of this section.

WAFER DISPOSITION

After a wafer has been inspected, it may be sent (dispositioned) to one of three output indexers by pressing the keypad ACC (Accept), RWK (Rework), or REJ (Reject) keys. When the wafer is transported to the appropriate indexer, another wafer will be transferred to the inspection stage.

REINSPECTION

1. To review an inspection program (from the beginning), press the "Roll" button to access the second page of the INSPECT menu.

2. Press the REINSPECT button when the system displays:

REINSPECT	JUMP
MARKER	NEXT SITE

OR

REINSPECT	JUMP
VERIFY	NEXT SITE

(Area/Site Data Storage Mode)

(Coordinate Offset Data Storage Mode)

3. If all sites/areas in the program have been cleared or no sites/areas have been programmed and no markers (Area/Site Data Storage Mode) have been set, the system will display:

NO SITES OR
AREAS ENTERED

Return to the PROGRAM mode (second page of Main Menu) to confirm the absence of sites/areas in the programmed inspection process. Then, if appropriate, program new sites/areas for inspection using the procedure outlined in the Pre-operation section. Set temporary markers by referring to "Adding a Marker Site" in this section.

4. If there are sites/areas in the program, the system will return to the first F.O.V. and step forward through the program. As the reinspection proceeds, the system will display:

INSPECTING AREA #__

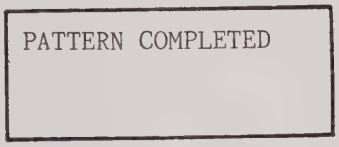
OR

INSPECTING MARKER __

OR

INSPECTING SITE #__

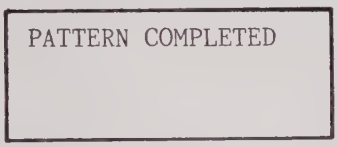
When the reinspection is completed, the system will display:



...and return to the second page of the INSPECT menu.
NEXT SITE

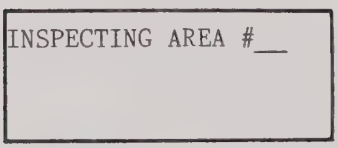
1. To exit from one area (or site) and step forward to the next, push the NEXT SITE button on the second page of the INSPECT menu.

2. If no further sites/areas have been programmed and no further markers have been set, the system will display:

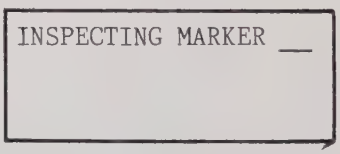


Return to the PROGRAM mode (second page of Main Menu) to program any additional sites/areas for inspection using the procedure outlined in the Pre-operation section. Add temporary markers by referring to "Adding a Marker Site" in this section.

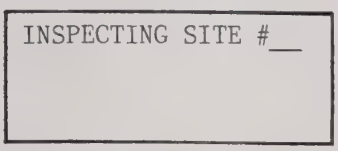
3. If further sites/areas are in the program, the typical screen will display:



OR



OR



The system will continue to step forward until all areas/markers/sites have been inspected. The system will then display:

PATTERN COMPLETED

... and return to the second page of the INSPECT menu.

PRE-PROGRAMMED JUMP

1. Press the JUMP button on the second page of the INSPECT menu.

2. If no jump has been programmed, the system will display:

NO JUMP DISTANCE ENTERED

Return to the PROGRAM mode (second page of Main Menu) to define a jump. Follow the procedure for defining a jump outlined in the Pre-operation section.

3. If a jump has been programmed, execute the jump by pressing the appropriate buttons on the following display:

LEFT	DOWN
RIGHT	UP

Push the UP/DOWN buttons if the jump is in the Y direction and the LEFT/RIGHT buttons if it is in the X direction. If the jump was programmed diagonally, use the combination of buttons required to execute the jump.

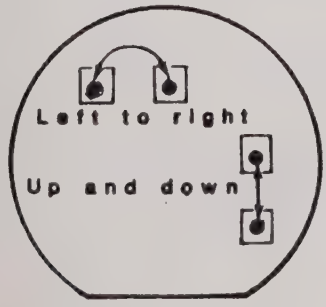


Figure 6-6

****
NOTE: If a jump has been programmed, it will permit the operator to move from a specific location on one reticle to the same location on another reticle (see Figure 6-6). This will allow the operator to investigate possible repetitive defects at the same location on other reticles.
****

MARKER SITES

In the Area/Site data storage mode, add or clear a temporary marker site by pressing the MARKER button on the second page of the INSPECT menu. When the button has been pushed, the system will display:

ADD MARKER SITE
CLEAR MARKER SITE

****
NOTE: A temporary marker may be used to provide a flag at a selected site where a defect has been observed and view the same site on successive wafers to determine if the defect is being repeated. All temporary markers are cleared when the program number or lot number is changed.
****

Adding a Marker Site

To add a marker site, move the stage manually to the selected site using the joystick or wait until the selected site is reached during the inspection process--then press the ADD MARKER SITE button. The system will display:

MARKER SITE __ ADDED RENUMBERING ...

("Renumbering ..." will be omitted at the end of the program)

OR

TOO MANY SITES

(If the number exceeds 64 per program or 256 total)

Clearing a Marker Site

To clear a marker, push the CLEAR MARKER SITE button when the selected marker is reached.

When the marker is cleared, the system will display:

MARKER SITE CLEARED RENUMBERING ...

("Renumbering" will be omitted at the last site in the program)

OR

NOT AT A MARKER

OR

PROGRAMMED SITE CANNOT BE CLEARED

****

NOTE: If any defect data is stored at the site being cleared, the system will prompt: PUSH ENTER TO CLEAR SITE'S DEFECT DATA. The marker site will be cleared after the ENT key has been pressed.

****

DEFECT DATA VERIFICATION

1. In the Coordinate Offset data storage mode, verify locations where defect data has been entered by pressing the VERIFY button when the system displays:

REINSPECT	JUMP
VERIFY	NEXT SITE

The system will return to the coordinate of the first defect entry relative to the F.O.V. in the upper left corner of the first area.

2. Press the ENT (Enter) key repetitively to step forward through the relative XY coordinates where defect data was entered.

As this process continues and is completed, the system will display:

VERIFYING DEFECTS	AND	ALL DONE

... and then return to:

REINSPECT	JUMP
VERIFY	NEXT SITE

****

NOTE: The VERIFY option shown on the second page of the INSPECT menu displaces the MARKER option only in the Coordinate Offset data storage mode.

****

STORED DATA DISPLAY

1. To view the outcome of your operating efforts, press the FNC (Function) key to return to the Main Menu.

SETUP	INPUT/OUTPUT
INSPECT	DIAG

(Main Menu)

2. Press the INPUT/OUTPUT button on the Main Menu. The system will display:

DISPLAY
PRINT

...and, when the button adjacent to the selected output mode has been pressed, the display will prompt:

LOT DATA
PROGRAM ID'S

Displaying Lot Data

1. Press the LOT DATA button to display the stored data from the program memory. A typical display will show:

SKIP	ACC	REW	REJ
0002	0003	0001	0001

2. Press the "Roll" button to access the second page of the LOT DATA display. A typical display will show:

SITE #	DEF #	DEF QTY
0001	0003	0002

(Area/Site Data Storage Mode)

OR

X	Y	DEF QTY
12345	67890	13

(Coordinate Offset Data Storage Mode)

When all data has been displayed the screen will prompt:

ALL DONE

Displaying Stored Program IDs

1. To determine what programs are stored, press the FNC (Function) key to return to the Main Menu and then push the INPUT/OUTPUT menu option. The system will display:

SETUP	INPUT/OUTPUT
INSPECT	DIAG

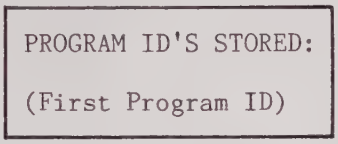
(Main Menu)

AND

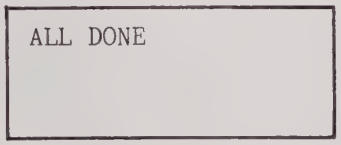
DISPLAY
PRINT

2. Push the button adjacent to DISPLAY or PRINT (if a printer is connected) on the resulting display. The screen will then provide two options:

3. Select PROGRAM ID'S by pressing the adjacent button to view the PROGRAM ID'S STORED display:



4. Push the "Roll" button to view other stored programs (only one program identification number will be displayed at a time). When all program identification numbers have been shown, the system will display:



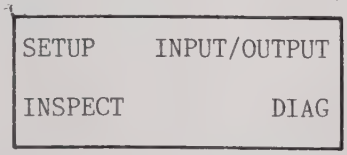
****

NOTE: If no programs are stored, only the ALL DONE display will appear.

****

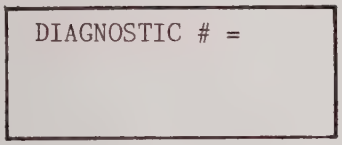
DIAGNOSTICS

1. To access system diagnostics, press the FNC (Function) key to return to the Main Menu.



(Main Menu)

2. Press the DIAG button on the Main Menu. The system will display:



3. Refer to the Service section of this manual to obtain further information and instructions.

SYSTEM OPTIONS

MOTORIZED OBJECTIVE TURRET OPTION

The optional Turret Nosepiece for the Brightfield Microscope (see Figure 6-7) holds up to five magnifying objectives that the operator may alternately rotate into position. A Darkfield Microscope with a four-position turret is available as an option.

Both turret systems include a standard 20X objective when they are shipped from the factory. Several other objectives are available, ranging from 5X to 100X magnification, in brightfield and darkfield.

If your system includes the turret option, it may be operated by using the Turret Keypad which is attached to the System Keypad. Push the keypad button for the selected objective to activate the turret and move the objective into position.

****

NOTE: The turret has been designed to save time and increase throughput by taking the most direct route available to access the selected objective.

****

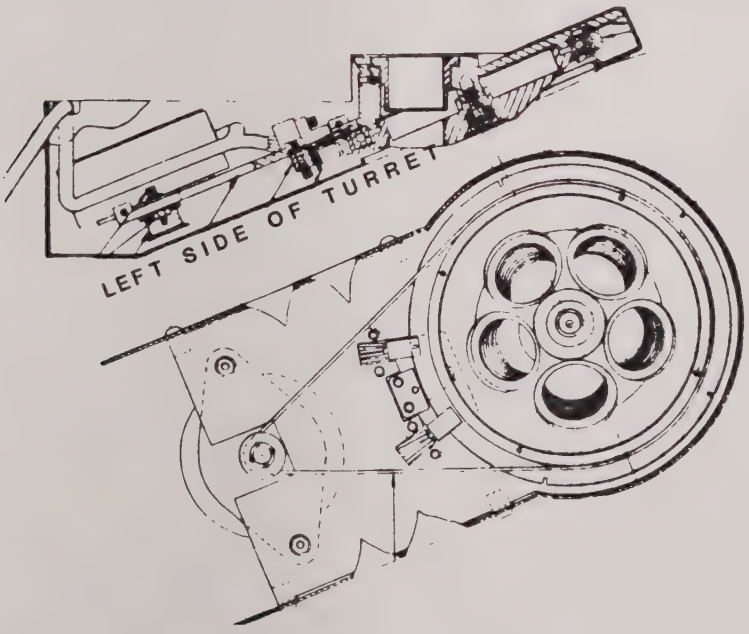


Figure 6-7 Brightfield Microscope (Inspection Stage view)

DARKFIELD MICROSCOPE SYSTEM OPTION

The darkfield illumination feature of the Darkfield/ Brightfield Microscope option shows details not readily visible with brightfield illumination. This is made possible by using darkfield illumination to create a light-on-dark reverse image within the operator's field of view.

If your system has the darkfield/brightfield microscope option, either type of illumination may be selected using the darkfield/brightfield control rod which protrudes from the left side of the microscope housing. Darkfield illumination may be selected by pulling outward on the enabling rod. Brightfield may be selected by pushing the rod back into its normal position.

OPERATION

GLOSSARY OF TERMS

AIR BEARING

A device that provides for free movement of the Inspection Stages. It is 1 inch in diameter and located on the vertical and horizontal axes. Its function is to provide an air cushion for the Inspection Stage to ride on.

AUTOFOCUS

The autofocus system operates by analyzing a spot of laser light retro-reflected from the wafer. It is a closed loop system that moves the chuck holding the wafer up or down in response to error signals generated from the laser spot.

AUTOFOCUS LASER

A small 2 milliwatt helium-neon gas laser transmitting light at 638.2 nanometers in the red light spectrum. It is mounted in the upper portion of the microscope behind of the binocular head. It is energised via the master power switch. The red light on the control console illuminates when the laser is energized.

CHUCK

The Chuck is mounted on the center of the X-Stage and holds the wafer in position for microscope examination.

COMPUTER MEMORY

Random Access Memory (RAM) is used in the Wafer Inspection Station to permit short-term data storage. The memory stores the totals of the Accept, Rework, and Reject wafer counts as well as defect sort data. Erasable Programmable Read-Only Memories (EPROM's) are used in the Wafer Inspection Station and contain the microprocessor program necessary to operate the system.

DEFECT CODES

Specific defects may be assigned any number from 1 through 99. To store defect data in memory, the appropriate number is entered on the keypad. For example, if a gel slug is observed at an inspection site, the operator should depress the assigned number button for gel slug. The cumulative total of such entries is maintained in memory for later readout.

"HOME" POSITION

The transfer alignment position for the Inspection Stages. The X and Y Stages automatically move to the Home position after a wafer has been released from the chuck to receive another wafer for inspection.

INDEXER

An elevator-like mechanism used to move (index) the wafer cassette vertically. It is used to position the cassette for wafer transfer into or out of the cassette.

INSPECTION STAGE

The inspection stages are moveable carriages capable of X and Y axis movement. The wafer chuck is a 1 1/2 inch diameter surface, on the X-Stage, that vacuum clamps to the bottom of the wafer, holding it in position during inspection movement. The stages may be moved by program or joystick command.

KEYPAD

A moveable assembly connected to the system and used by the operator to input information or commands into the Wafer Inspection Station.

MICROSCOPE

The Microscope is located on the top of the system and contains the optics, laser, illuminator, and electronics necessary for the autofocus to function.

SKIP MODE

The skip mode allows the operator to select a number of wafers in the Send cassette to be skipped and therefore not inspected. When "Skip" is used, 1 to 9 wafers may be selected to be skipped.

X-AXIS

Right-to-left or left-to-right movement of the X-Stage as seen from the operator position.

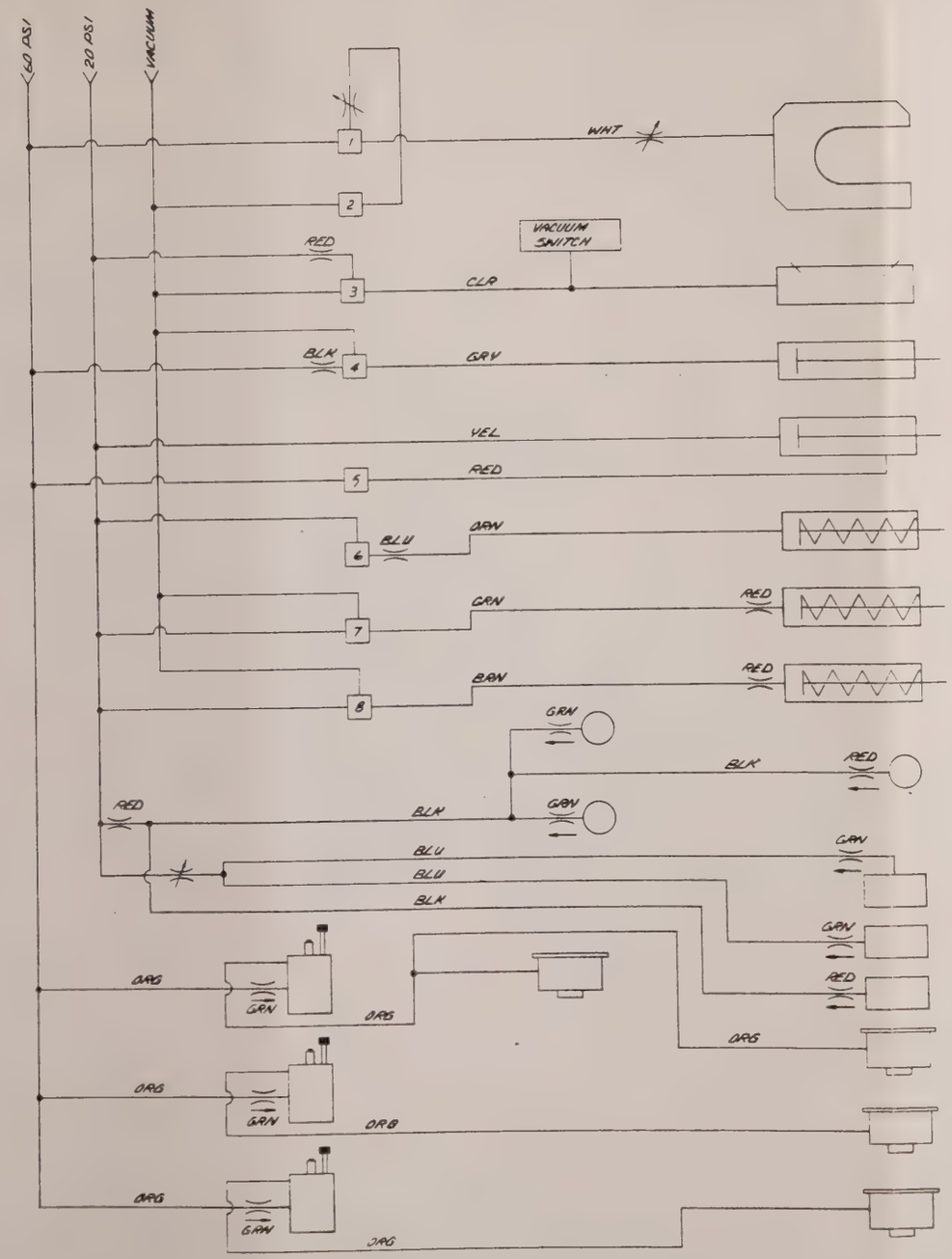
Y-AXIS

Front-to-back or back-to-front movement of the Y-Stage as seen from the operator position.

Z-AXIS

Vertical movement of the Inspection Stage. Typically used in referring to the Inspection Stage Air Bearings that act as the feet of the Inspection Stage;ie, Z-axis air bearing.

LTR	REVISION DESCRIPTION	
A	RELEASE PER ECO 355	7-30-82
B	REVISED AND REDRAWN PER ECO 428 DMH	12-2-82
C	" PER ECO 487 JH	



PRE ALIGN AIR

PRE ALIGN VACUUM

CHUCK VACUUM

CHUCK DOWN

TRANS. CYL

PRE ALIGN TILT

BELT LIFT - RIGHT

BELT LIFT - LEFT

"Y" STAGE - VERTICAL BEARINGS

"Y" STAGE - "X" GUIDE BAR AIR BEARINGS (4X)

"X" STAGE - "Y" GUIDE BAR AIR BEARINGS (4X)

"X" STAGE VERTICAL AIR BEARINGS (4X)

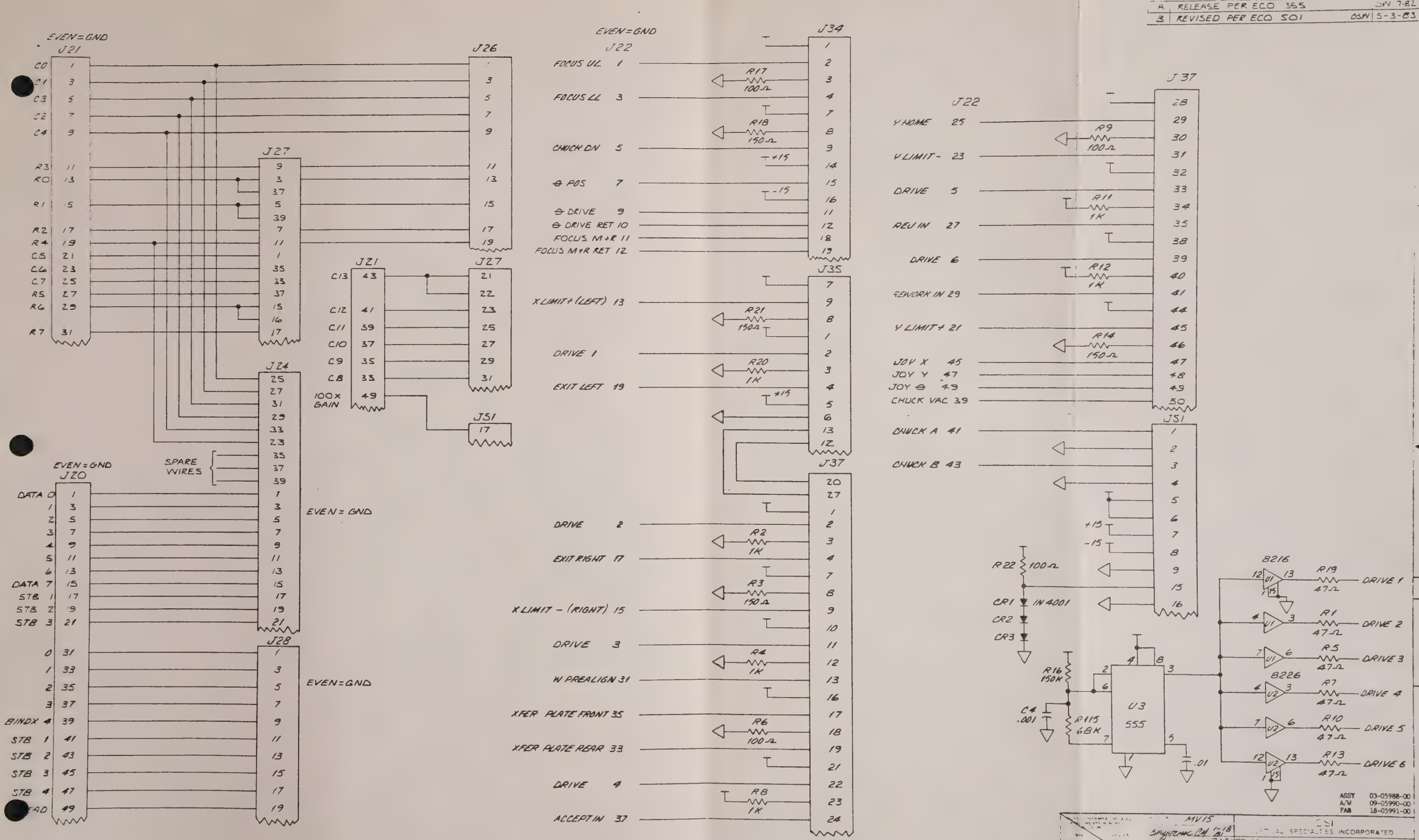
REAR AIR MOUNTS

FRONT AIR MOUNT RIGHT

FRONT AIR MOUNT LEFT

	MODEL NO MV-15	OSI OPTICAL SPECIALTIES INCORPORATED
		DWG TITLE PNEUMATIC SCHEMATIC MV-15
		SIZE D DWG NO 07-06064-00 REV C
		SHT 1 OF 1

A	RELEASE PER ECO 355	GW	7-87
B	REVISED PER ECO 501	GSW	5-3-88



ASSY 03-05988-00
A/W 09-05990-00
PAB 18-05991-00

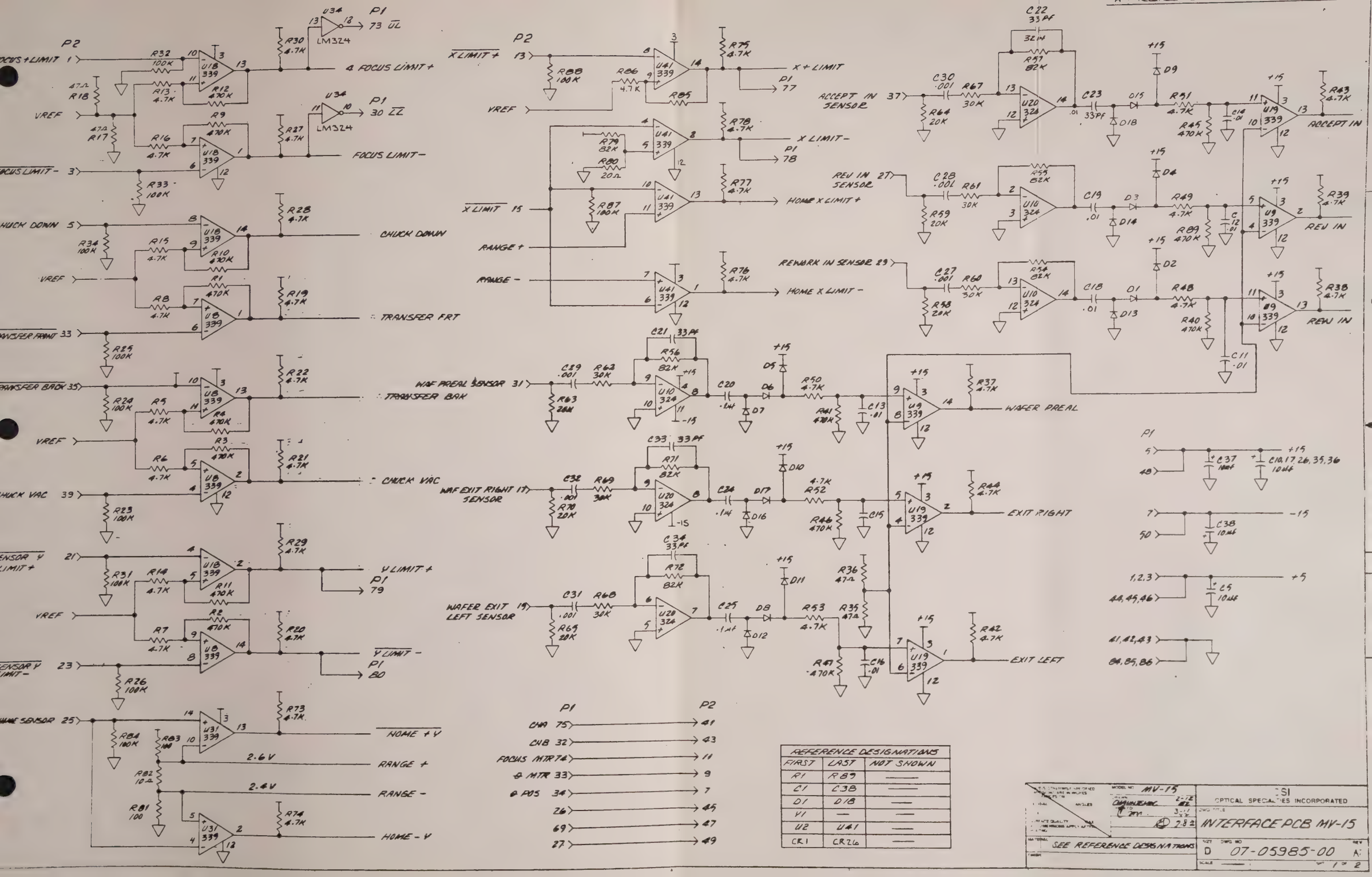
MV15

CSI
CYBERNETIC SPECIALTIES INCORPORATED

MV-15 INTERCONNECT BD.

D 07-05989-00 B

1 of 1



REFERENCE DESIGNATIONS		
FIRST	LAST	NOT SHOWN
R1	R89	—
C1	C38	—
D1	D18	—
V1	—	—
U2	U41	—
CR1	CR26	—

MODEL NO MV-15
DRAWING NO D 07-05985-00 REV A
SEE REFERENCE DESIGNATIONS
OPTICAL SPECIALTIES INCORPORATED
INTERFACE PCB MV-15
1 OF 2

LTR		
A	RELEASE PER ECO 355	GW 7-8

P3
27 PREAL AIR
29 PREAL VAC
31 CHUCK VAC
33 CHUCK DN
35 PREAL TRANSFER
37 STAGE LOCK
49 LIFT BAR RIGHT
47 LIFT BAR LEFT

45 PREALIGN
43 } SPARE
41 }
5 SKIP +
7 SKIP –
9 X FEED +
11 X FEED –
13 SORT +

15 SORT –
1 PREAL MTR
39 SPARE SOL
3 SPARE MTR

P1
20 BS0
21 BS1
22 BS2
23 BS3
63 BS4
64 BS5
65 BS6
66 BS7

AF WAFER
35 FOCUS
36 CAL OK
37 B ENTER
SPARE

P4
9 BID-4
7 BID-3
5 BID-2
3 BID-1
1 BID-0

11 STB1
13 STB2
15 STB3
17 STB4
READ 2
19 READ

SENSOR 1 STB
SENSOR 2 STB
INDEX STAT RD STB
READ MTR STAT STB
SENSOR 3 STB

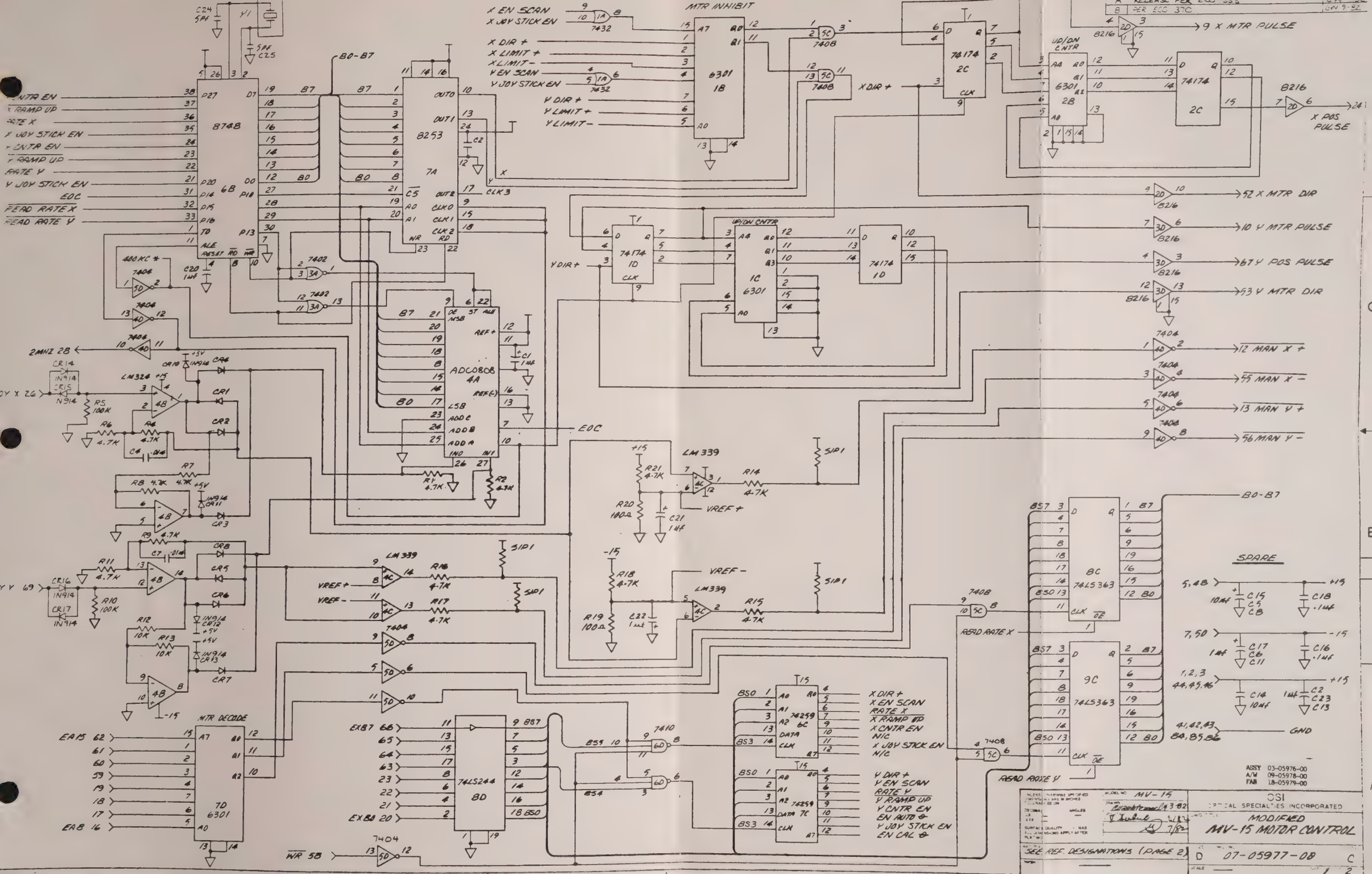
MODEL NO	MV-15
DRAWN	8-12
CHECKED	3-11
APPROVED	
MATERIAL	SEE REF. DESIGNATIONS (PAGE 1)

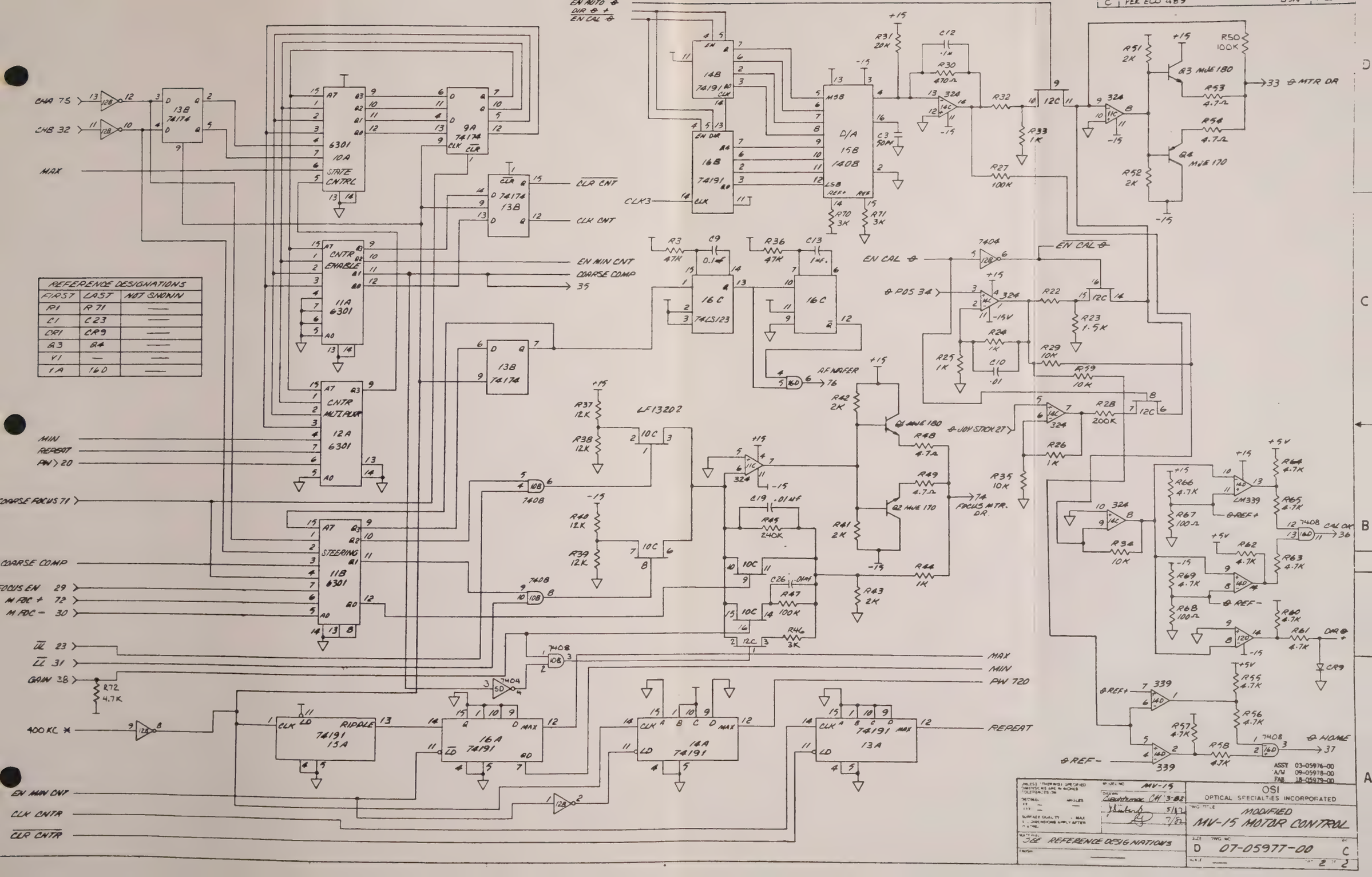
OSI
OPTICAL SPECIALTIES INCORPORATED

DWG. TITLE
INTERFACE PCB MV-15

SIZE	DWG NO	REV
D	07-05985-00	A

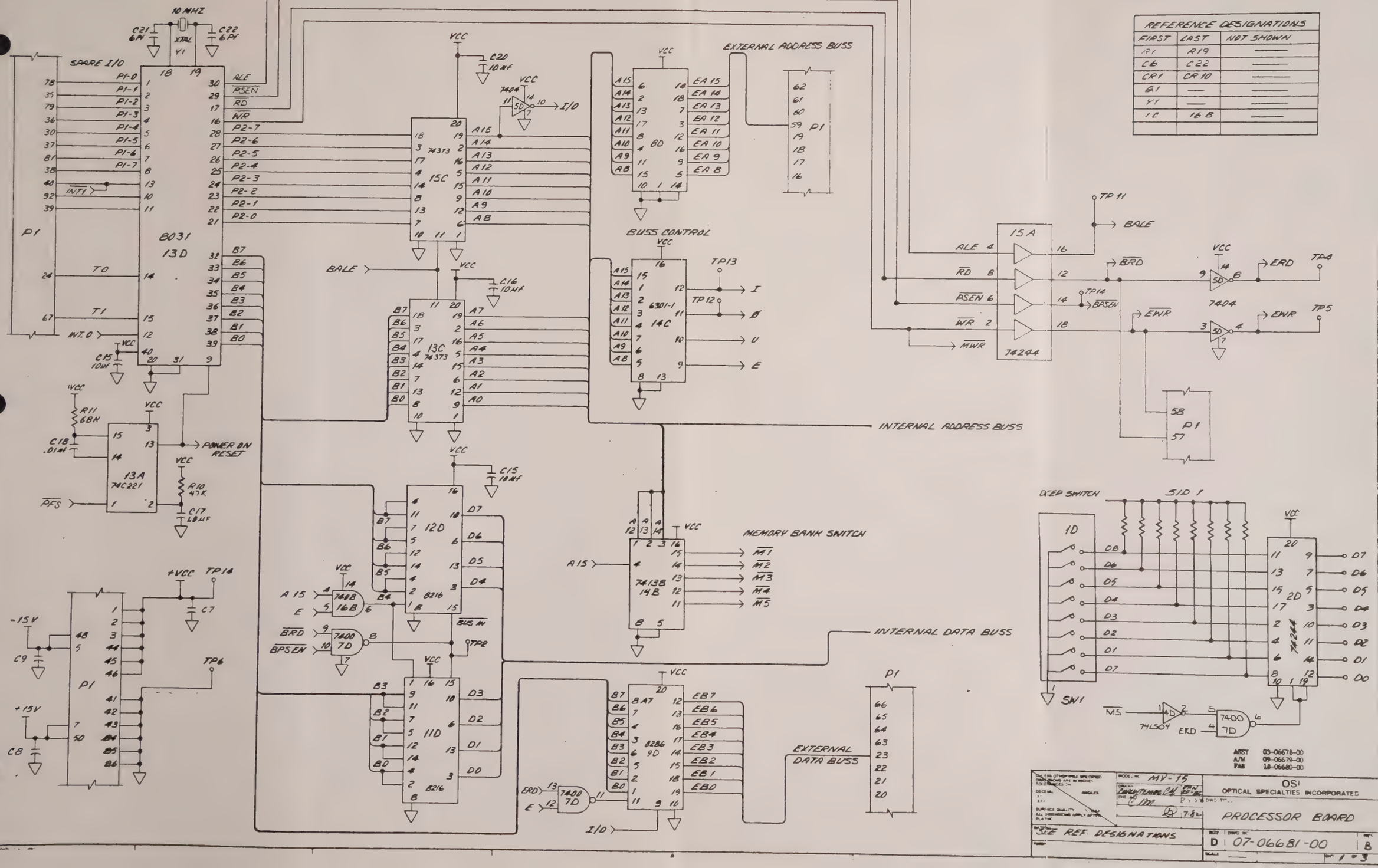
SCALE —— SHT 2 OF 2


8748
8253
ADC0808
6301
74174
74LS363
74LS244
74259
LM339
LM324
MTR INHIBIT
MTR DECODE
SPARE
MODIFIED
MV-15 MOTOR CONTROL
OSI
SEE REF. DESIGNATIONS (PAGE 2)
D 07-05977-08 C


REFERENCE DESIGNATIONS
FIRST | LAST | NOT SHOWN
R1 | R 71 | —
C1 | C23 | —
CR1 | CR9 | —
Q3 | Q4 | —
V1 | — | —
1A | 16D | —
CHA 75
CHB 32
MAX
CLR CNT
CLK CNT
EN MIN CNT
COARSE COMP
35
MIN
REPEAT
PW > 20
COARSE FOCUS 71
COARSE COMP
FOCUS EN 29
M FOC + 72
M FOC − 30
23
31
GAIN 38
272
4.7K
400 KC
EN MIN CNT
CLK CNTR
CLR CNTR
EN AUTO Θ
DIR Θ +
EN CAL Θ
CLK3
R31 20K
C12 .1M
R30 470Ω
R32
R33 1K
R27 100K
C3 50PF
R70 3K
R71 3K
R50 100K
R51 2K
R53 4.7Ω
R54 4.7Ω
R52 2K
Q3 MJE 180
Q4 MJE 170
33 Θ MTR DR
R3 47K
C9 0.1MF
R36 47K
C13 1MF.
16C
74LS123
EN CAL Θ
Θ POS 34
R22
R23 1.5K
R24 1K
R25 1K
C10 .01
R29 10K
R59 10K
AF RAFER
76
R42 2K
Q1 MJE 180
R48 4.7Ω
R49 4.7Ω
Q2 MJE 170
74 FOCUS MTR. DR.
R41 2K
R43 2K
R44 1K
R46 3K
C19 .01MF
R45 240K
C26 .01MF
R47 100K
R37 12K
R38 12K
R40 12K
R39 12K
LF13202
Θ JOY STICK 27
R28 200K
R26 1K
R35 10K
R34 10K
+5V
R64 4.7K
R65 4.7K
R66 4.7K
R67 100Ω
LM339
Θ REF+
CAL CH 36
R62 4.7K
R63 4.7K
R69 4.7K
R68 100Ω
Θ REF−
R60 4.7K
R61 4.7K
DIR Θ +
CR9
R55 4.7K
R56 4.7K
R57 4.7K
R58 4.7K
Θ HOME 37
MAX
MIN
PW 720
REPEAT
ASST 03-05976-00
A/W 09-05978-00
FAB 18-05979-00
OSI
OPTICAL SPECIALTIES INCORPORATED
MODIFIED
MV-15 MOTOR CONTROL
SEE REFERENCE DESIGNATIONS
D 07-05977-00 C
SHT 2 OF 2

REV	DESCRIPTION	DATE
A	RELEASE PER ECO 355	GW 7-82
B	PER ECO 369	GW 9-82

REFERENCE DESIGNATIONS		
FIRST	LAST	NOT SHOWN
R1	R19	——
C6	C22	——
CR1	CR10	——
B1	——	——
Y1	——	——
1C	16B	——



ASSY	03-06678-00
A/W	09-06679-00
FAB	18-06680-00

OSI
OPTICAL SPECIALTIES INCORPORATED

MODEL MV-15

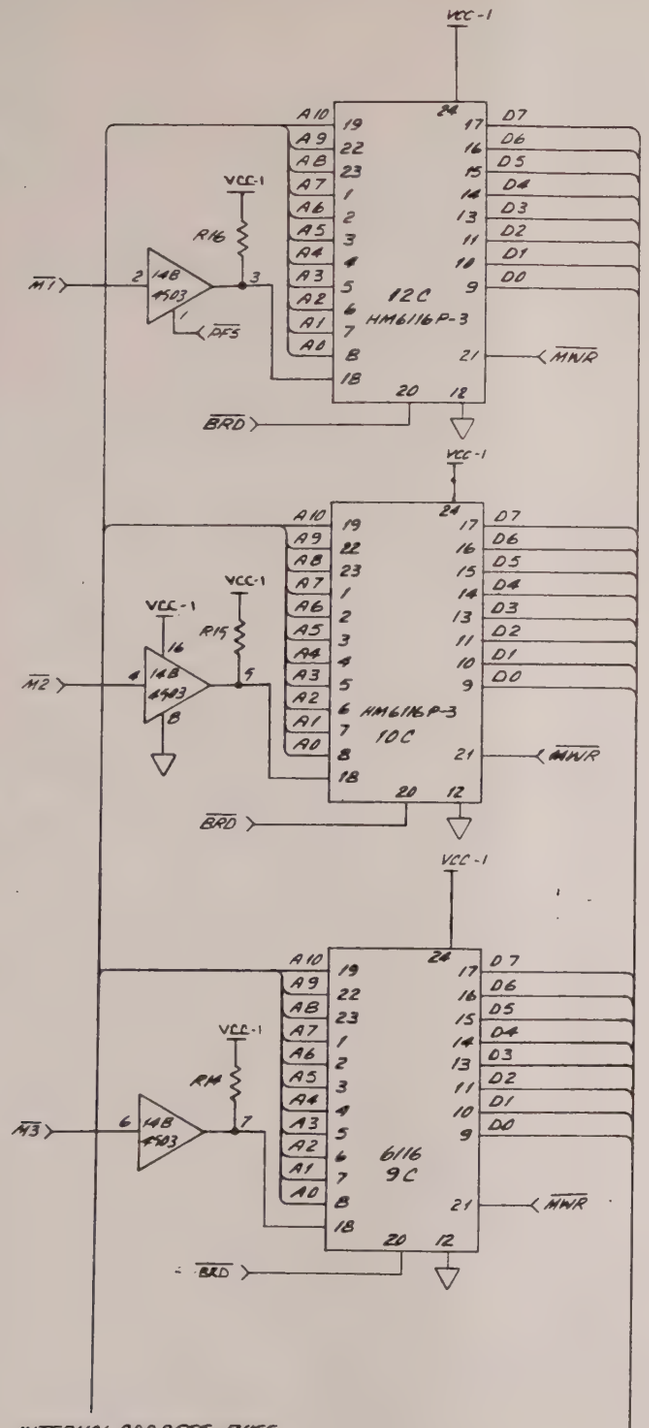
PROCESSOR BOARD

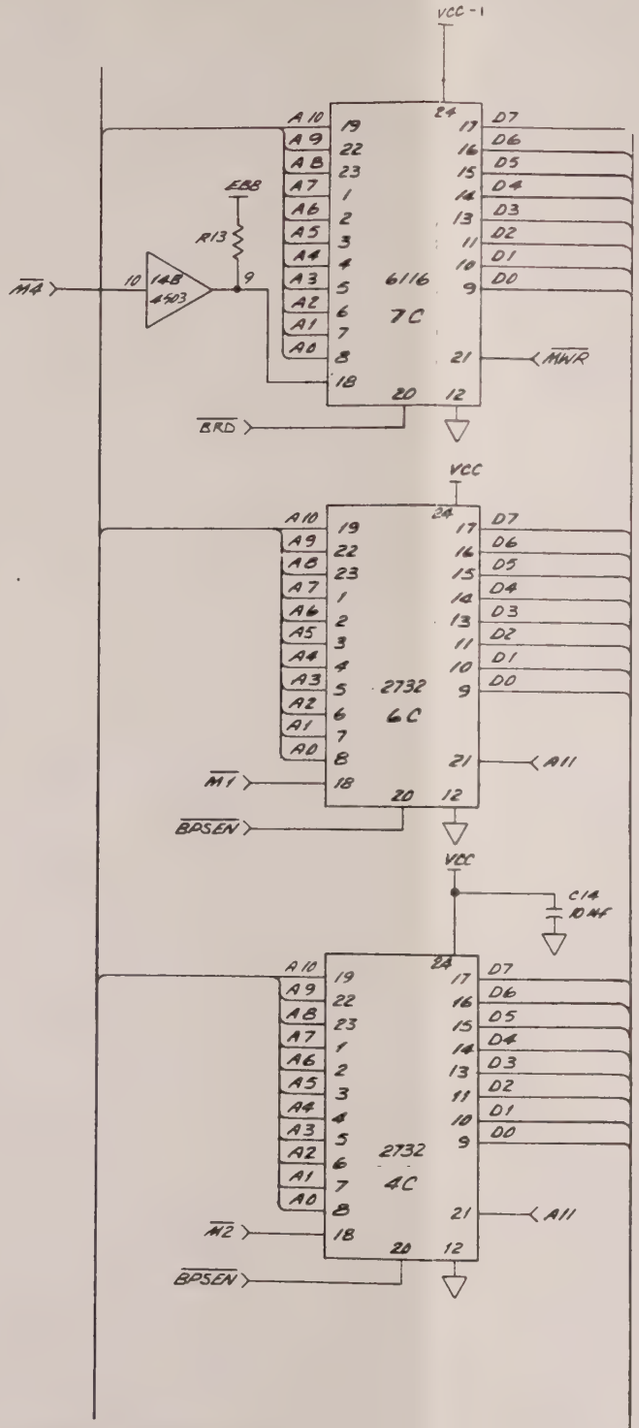
SEE REF. DESIGNATIONS

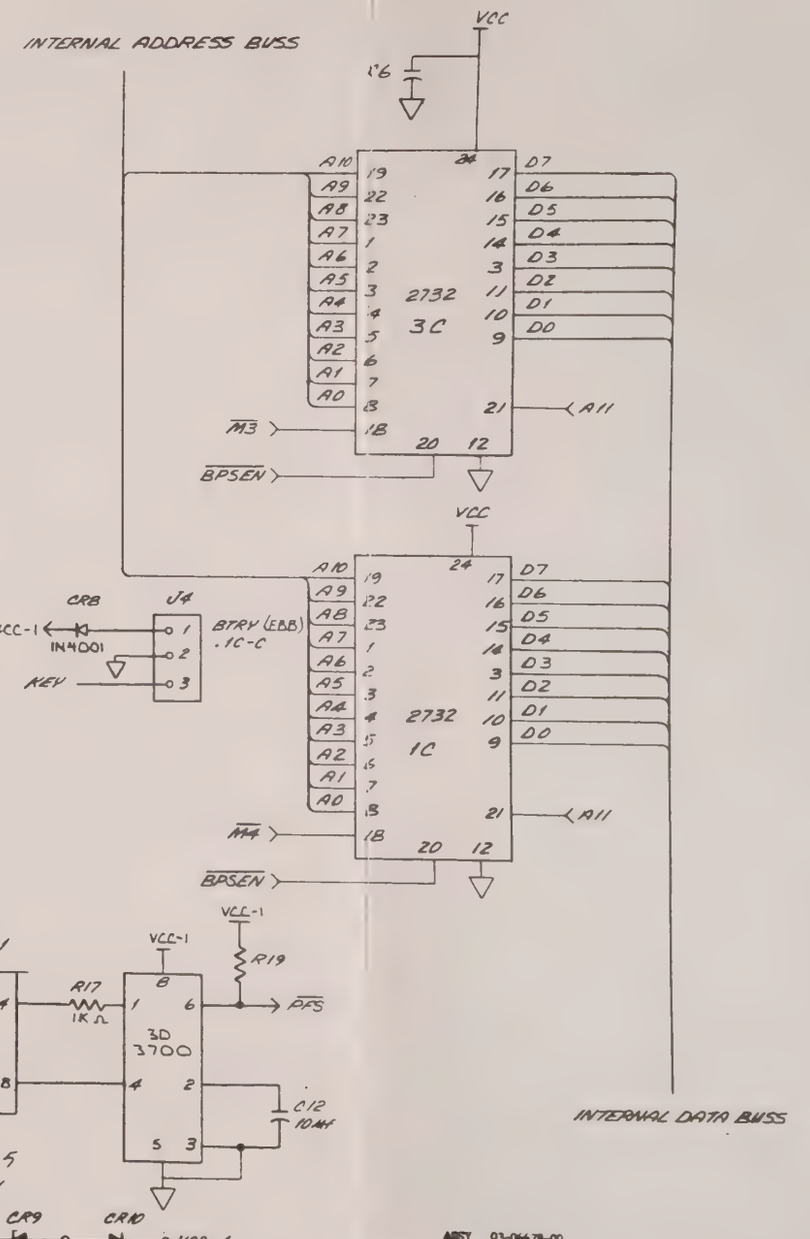
SIZE D | 07-06681-00 | REV 8

SHT 1 OF 3

LTR	REVISION DESCRIPTION	
A	RELEASE PER ECO 355	GW 7-82
B	PER ECO 369	GW 9-82







ABST	03-06678-00
A/W	09-06679-00
PAB	18-06680-00

MODEL NO.	MV-15
DRAWN	[illegible] 7-82
CHECKED	[illegible] 7-82
REF DESIGNATIONS (PAGE 1)	

OSI
OPTICAL SPECIALTIES INCORPORATED

DWG TITLE: PROCESSOR BOARD

SIZE D | DWG NO. 07-06681-00 | REV B

SCALE ——— | SHT 2 of 3

LTR	REVISION DESCRIPTION	
A	RELEASE PER ECO 355	GW 7-82
B	PER ECO 3369	GW 9-82

NOTE: DO NOT USE P1-P29, P1-P30, P1-P71, P1-P72.

8155 10B

8155 6B

MANUAL FOCUS −
MANUAL FOCUS +
COARSE FOCUS
FOCUS ENABLE

LED STROBE
DISPLAY STROBE
DISPLAY DATA

INT. 0

INTERNAL DATA BUSS

8251 2B

RXD
DSR
CTS
DTR
RTS
TXD
RX RDY
TX RDY

POWER ON RESET

J72
J3

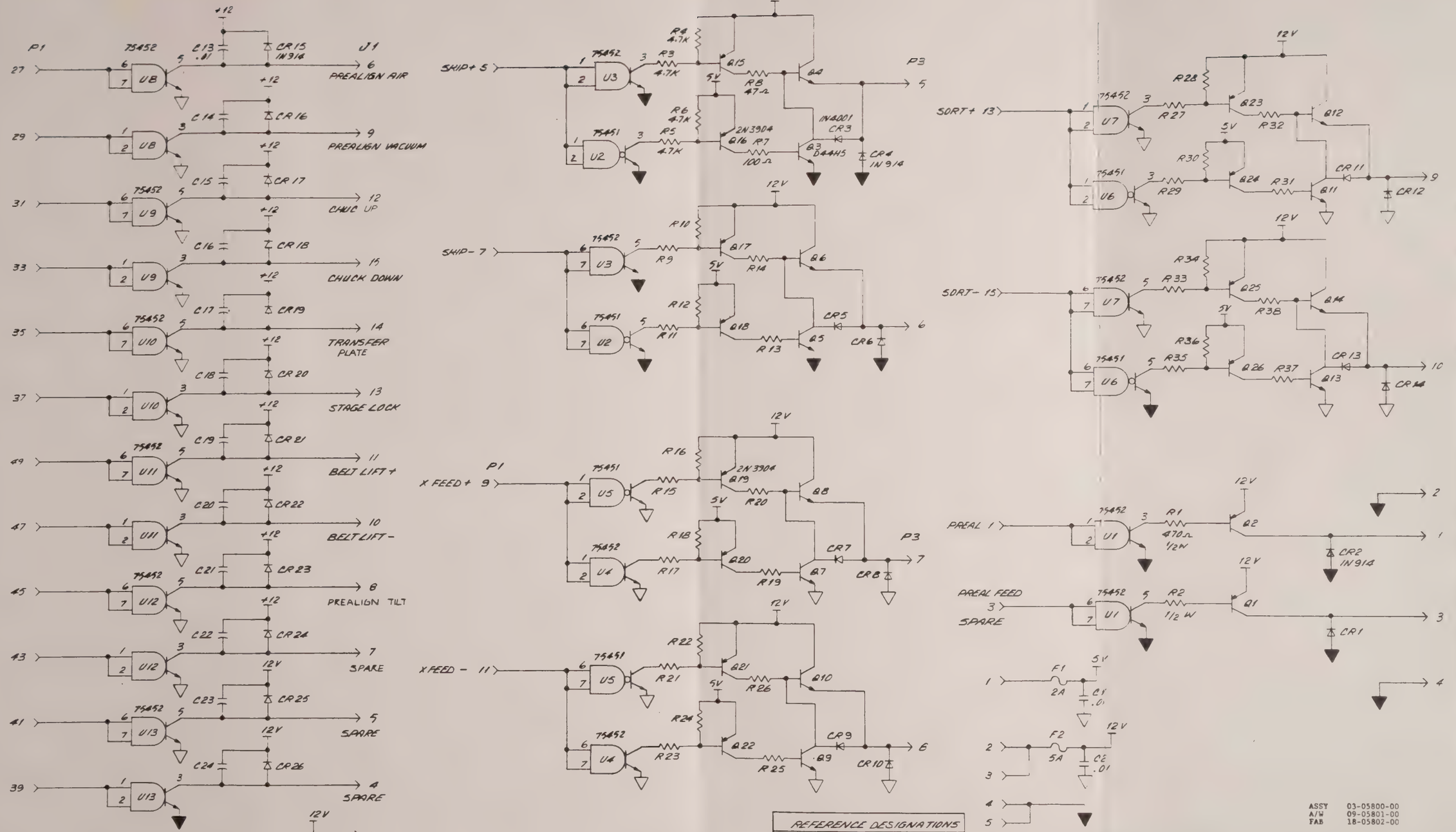
2AA
2AB
3A
3A

OSI
OPTICAL SPECIALTIES INCORPORATED

PROCESSOR BOARD

D7-06681-00

SEE REF. DESIGNATIONS (PAGE 1)



P1 = RIBBON 50 PIN
P2= 15 PIN
P3=
P4=

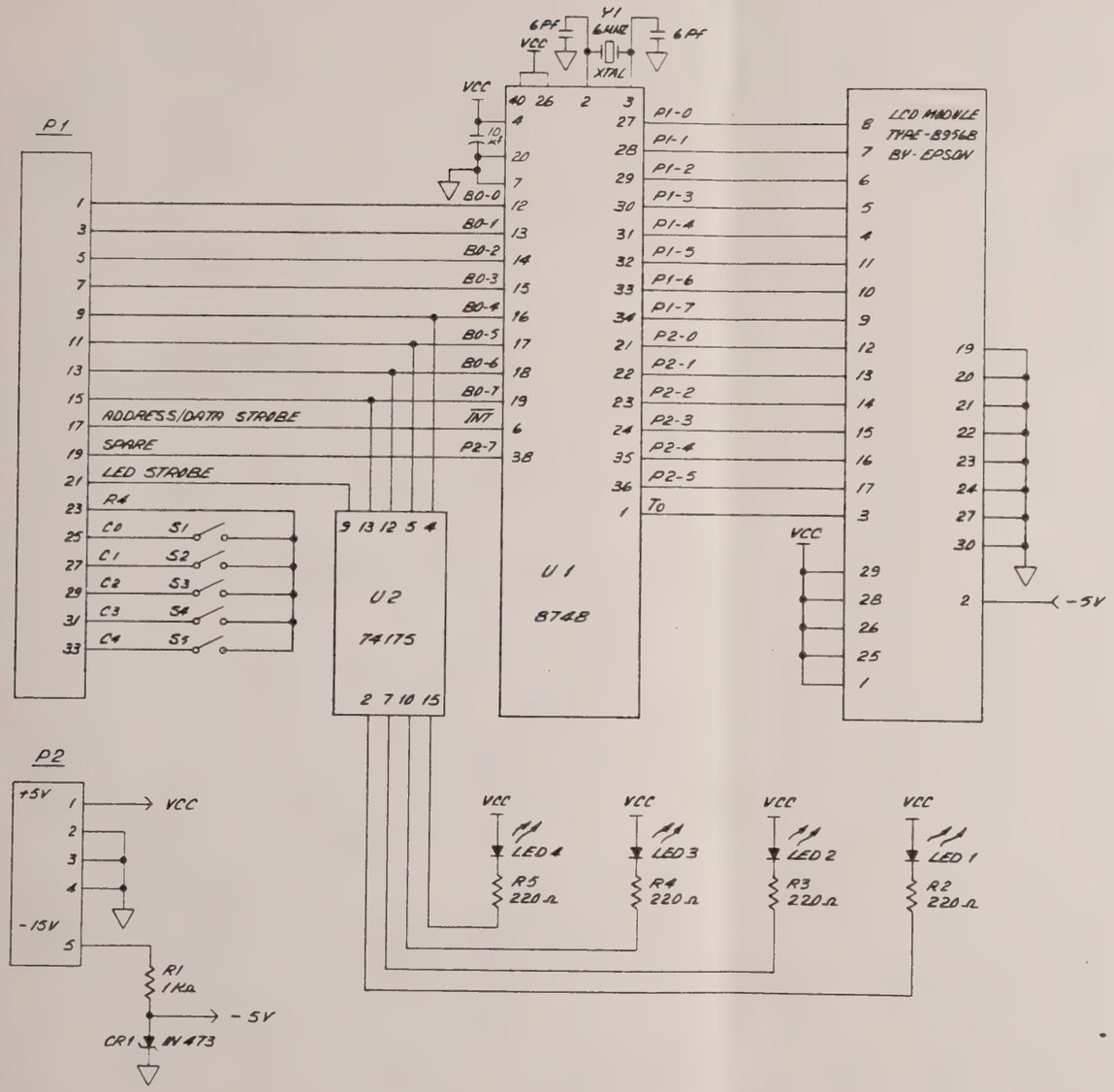
REFERENCE DESIGNATIONS		
FIRST	LAST	NOT SHOWN
R1	R38	———
C1	C24	C3 - C12
CR1	CR26	———
Q1	Q22	———
U1	U13	———

ASSY 03-05800-00
A/W 09-05801-00
FAB 18-05802-00

MODEL NO.	MV-15
DRAWN	[illegible]
CHECKED	[illegible]
ENG.	[illegible]
MFG.	[illegible]
OSI	OPTICAL SPECIALTIES INCORPORATED
SOLENOID DRIVER PCB	
SIZE D	DWG. NO. 07-05803-00
REV. A	
SCALE	SHT. 1 OF 1

A	RELEASE PER ECO 355	GW 7-82

NOTE:
ALL EVEN PINS (2-40) ON P1 ARE GROUNDED.



REFERENCE DESIGNATIONS		
FIRST	LAST	NOT SHOWN
R1	R5	———
Y1	—	———
U1	U2	———

MODEL NO.	MV-15	OSI OPTICAL SPECIALTIES INCORPORATED
DRAWN	GW 7-82	
CHECKED	[illegible] 8-2	DWG. TITLE: DISPLAY BD.
	GW 7-82	
SIZE D	DWG. NO. 07-05918-00	REV. A

NOTES (UNLESS OTHERWISE SPECIFIED):

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
B		2-12-81	
C	#100		
D	#151-#173		
E	PER ECO 220		

P1
1 B1
3 B1
5 B2
9 B4
7 B3
11 STB 1
13 STB 2
15 STB 3
17 STB 4
19 READ

U4 14365
U8 79173
MTR DWN
MTR UP
MTR ON
R50 4.7K

J6
+5V 1
+12V 3
MTR GND 4
+12V 5
.047 C5
10µf C1, C4
10µf C3
10µf C2
C17 10µf

WAFER=0

J2
12V M+R

UL=1
LL=1
SLOT=Ø
CARRIER=0
VREF

5KHZ OSCILLATOR

U6 324
U5 555
U7 339
U7 324

R23 4.7K
R22 47K
R21 4.7K
R20 4.7K
R41 47K
R42 4.7K
R46 4.7K
R24 4.7K
R38 4.7K
R39 30K
R40 47K
R44 47K
R45 4.7K
R30 150K
R31 68K
R36 4.7K
R35 470K
R53 3.9K
R52 1K
R51 820
R19 390
R32 82Ω
R33 30K
R34 4.7 MEG
R37 10K
R18 20K
R25 100Ω
R26 1K
R27 150Ω
R28 150Ω
R29 150Ω
R43 100K
R47 100K
R48 100K
R49 150Ω
C8 .001µf
C11 .1
C13 .01
C6 .1µf
C9 .01µf
C10 .001
C12 5PF
C14 1µf
C15 .01
C16 .01
C7 .01

CR6 1N914
CR7 1N914
CR1 1N4004
CR2 1N914
CR3 1N4004
CR4 1N914

Q1 D44H5
Q2 2N3906
Q3 2N3906
Q4 D44H5
Q5 D44H5
Q6 2N3906
Q7 2N3906
Q8 D44H5
Q9 D44H5

R1 1K
R2 410Ω
R3 2K
R4 4.7K
R5 100Ω
R6 10K
R7 2K
R8 4.7K
R9 100Ω
R10 10K
R12 4.7K
R13 10K
R14 47Ω
R15 4.7K
R16 10K
R17 47Ω

J7
J8

75451
U1
U2
U3

T/L 144
T/L 147

UPPER LIMIT SENSOR S1
LOWER LIMIT SENSOR S2
SLOT SENSOR S3

MTR DWN
MTR UP
BLT ON

ASSY 03-04682-00
ARTWORK 09-04683-00
PWB 18-00401-00

MATERIAL		DRAWN	DATE 5-30-80
FINISH		CHECKED	DATE
NEXT ASSY	USED ON	APPROVAL	DATE
APPLICATION		APPROVAL	DATE
		RELEASED	DATE

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND ARE IN ACCORDANCE WITH ANSI Y 14.5

TOLERANCES
DEC X ±
DEC XX ±
DEC XXX ±
FRACTIONS ±
ANGLES ±

OPTICAL SPECIALTIES

SCHEMATIC
LOADER MODULE

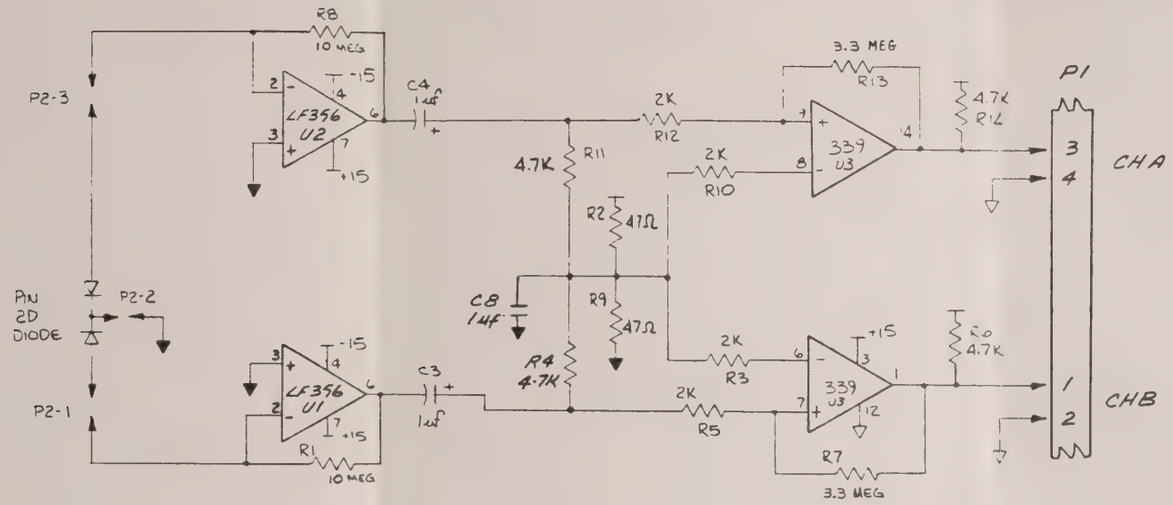
SIZE	FSCM NO	DWG NO	REV
D		07-04660-00	E

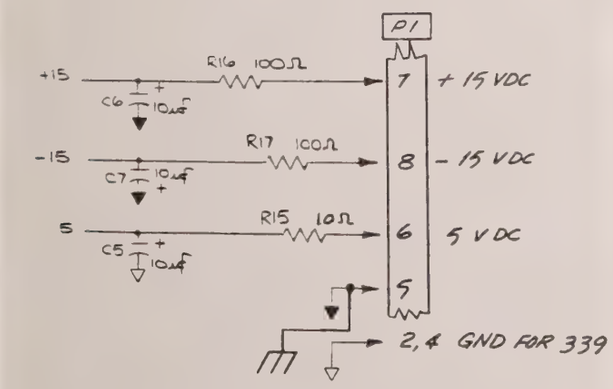
SCALE

SHEET 1 OF 1

1/79 DIETZGEN-POST CLEARPRINT

LTR	REVISION DESCRIPTION		
B	ECO # 67 (EFFICIENCY REVS. 512)	JL	12 80
C	PER ECO 118	JEC	1 30 81
D	PER ECO 212	KJ	7-7-81
E	PER ECO 243	KJ	7-14-81
—	REVISED PER RC # 48	CCOY	4-26-83
F	PER ECO 519	GSW	6-14-83





ASSY 03-04504-00
ARTWORK 09-04502-00
FAB 18-04503-00

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMAL .X ± .XX ± ANGLES ± SURFACE QUALITY √ MAX ALL DIMENSIONS APPLY AFTER PLATING

MATERIAL

FINISH

MODEL NO.

DRAWN K Patterson 7/83

CHECKED

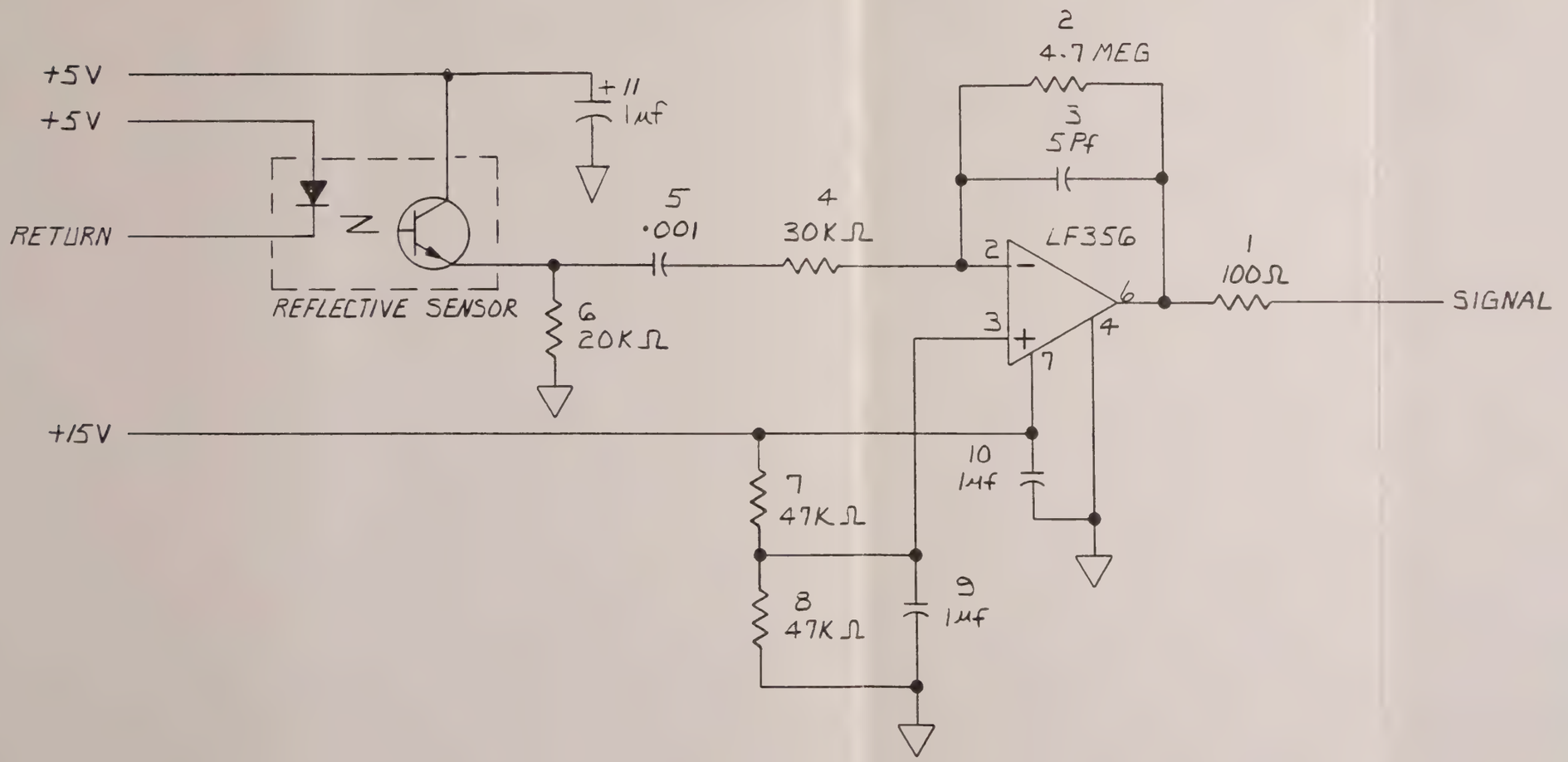
OSI
OPTICAL SPECIALTIES INCORPORATED

DWG. TITLE
AUTO FOCUS PRE-AMP BD.

SIZE C | DWG. NO. 07-04501-00 | REV F

SCALE | SHT 1 OF 1

LTR	REVISION DESCRIPTION		
B	ECO # 227	J	7-15-81
C	PER ECO 296	AK	1-9-82



UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMAL ANGLES
XX =
XXX =
SURFACE QUALITY: MAX
ALL DIMENSIONS APPLY AFTER PLATING

MODEL NO.
DRAWN C. Symes 2/11/81
CHECKED

MATERIAL:
FINISH:

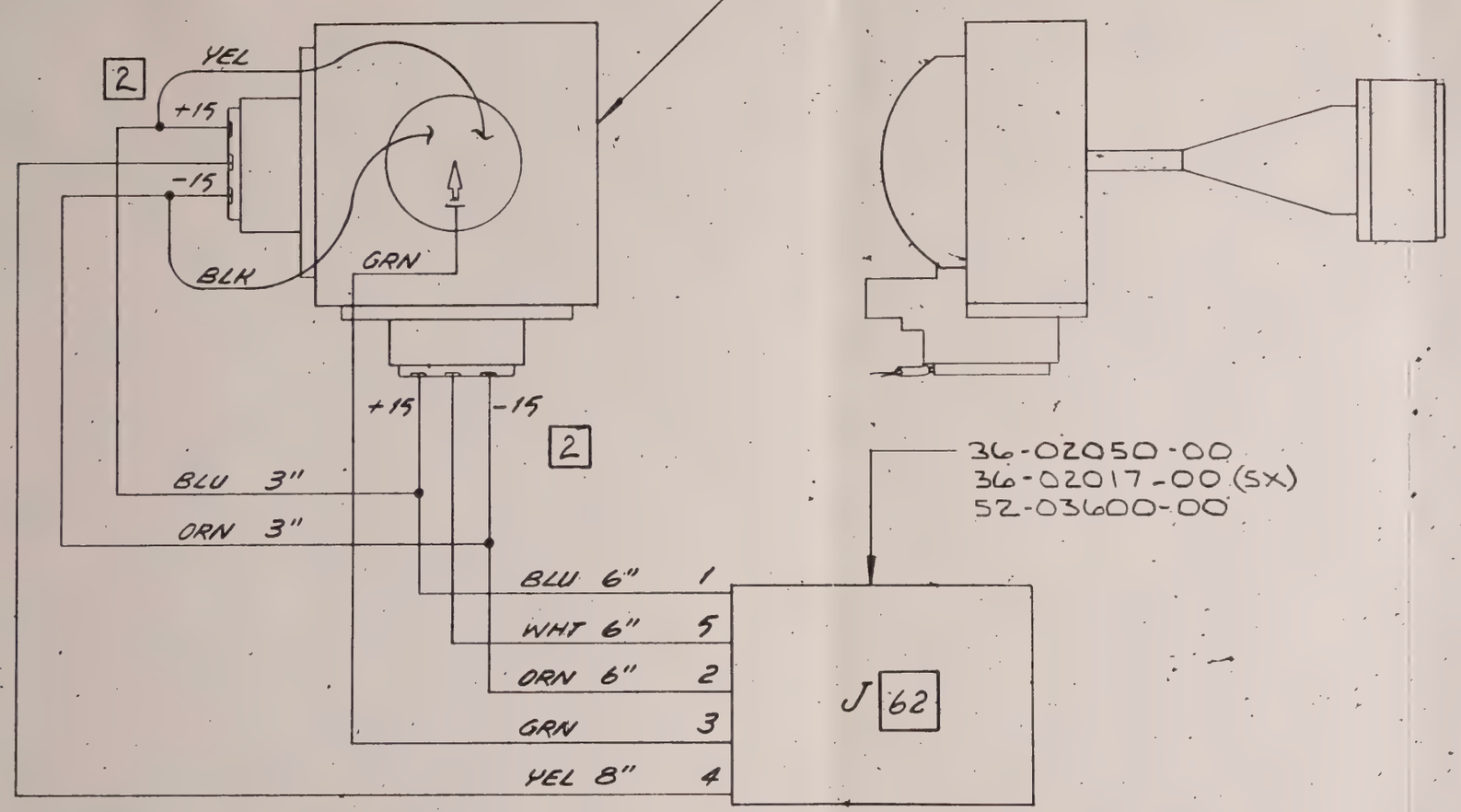
OSI
OPTICAL SPECIALTIES INCORPORATED

DWG. TITLE:
SCHEMATIC - SENSOR PRE AMP PCB

SIZE B | DWG. NO. 07-04958-00 | REV C

SCALE NONE | SHT 1 OF 1

LTR	REVISION DESCRIPTION	
A	RELEASE PER ECO 355	7-82



NOTE:
1. ALL HOOK UP WIRE IS 24 AWG.
2. SHRINK TUBING (44-02800-00) ON ALL TERMINALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMAL ANGLES
XX ± \
.XXX ±
SURFACE QUALITY √ MAX
ALL DIMENSIONS APPLY AFTER PLATING

MATERIAL

FINISH

MODEL NO. MV-15

DRAWN	CHANNTONOL CM	4-82
	J. V.	4-82
		7-82

OSI
OPTICAL SPECIALTIES INCORPORATED

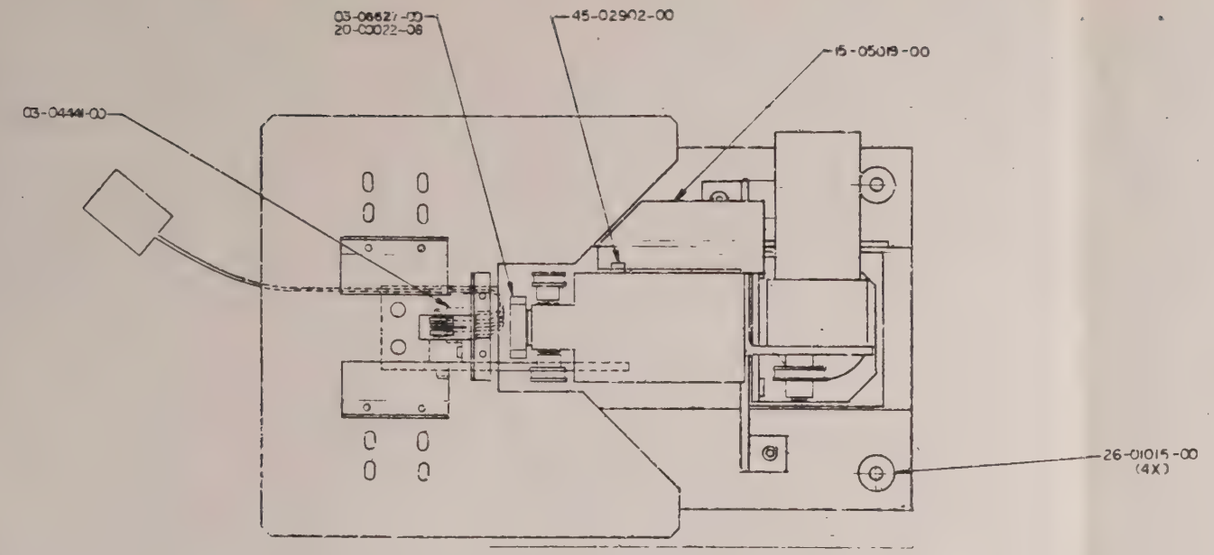
DWG. TITLE
JOY STICK ASSY.

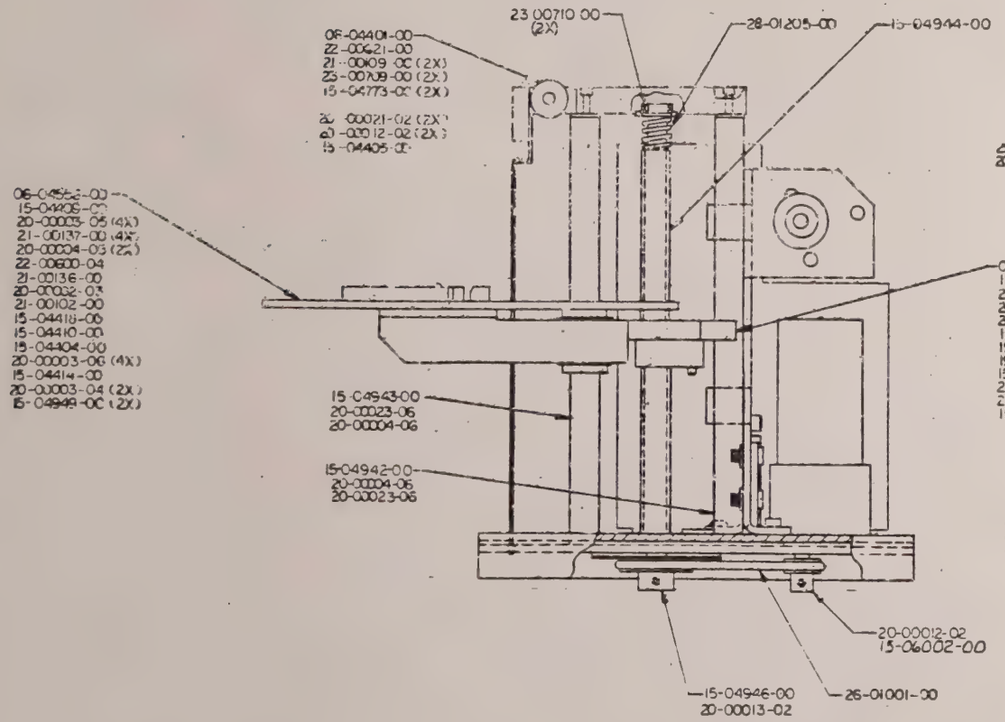
SIZE B | DWG. NO. 03-06330-00 | REV. A

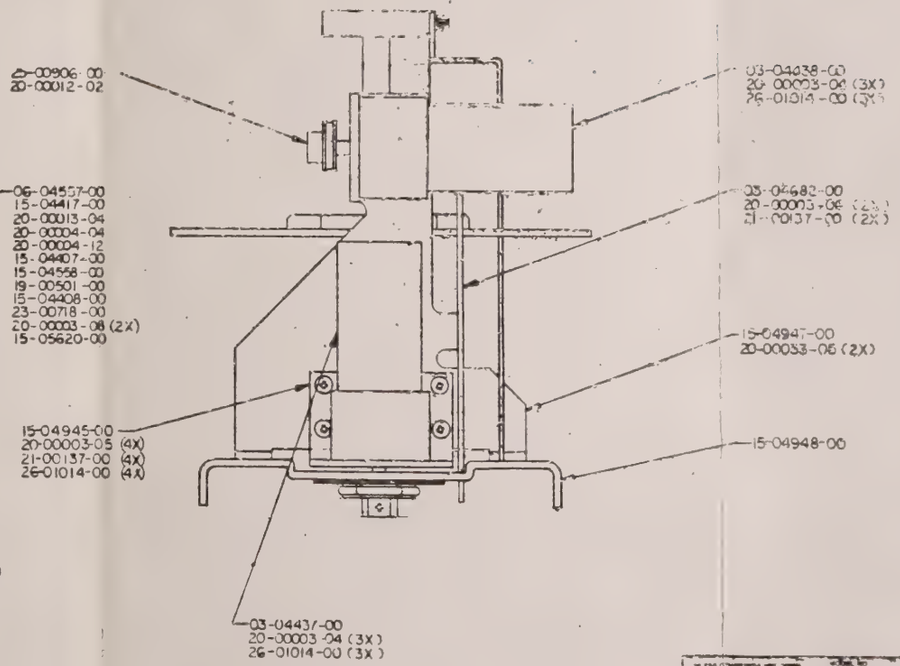
TITLE —

SHEET 1 OF 1

REVISIONS			
A	ECO 119	[illegible]	[illegible]
B	REV PER ECO #164	DM	4/10/81
C	ECO 223	KC	7/10/81
D	ECO 237	GrL	10-20-81
E	PER ECO 261	KK	12-17-81
F	PER ECO 278	MK	1-18-82
G	PER ECO 342	HP	5-24-82
H	PER ECO 359	HP	6-3-82







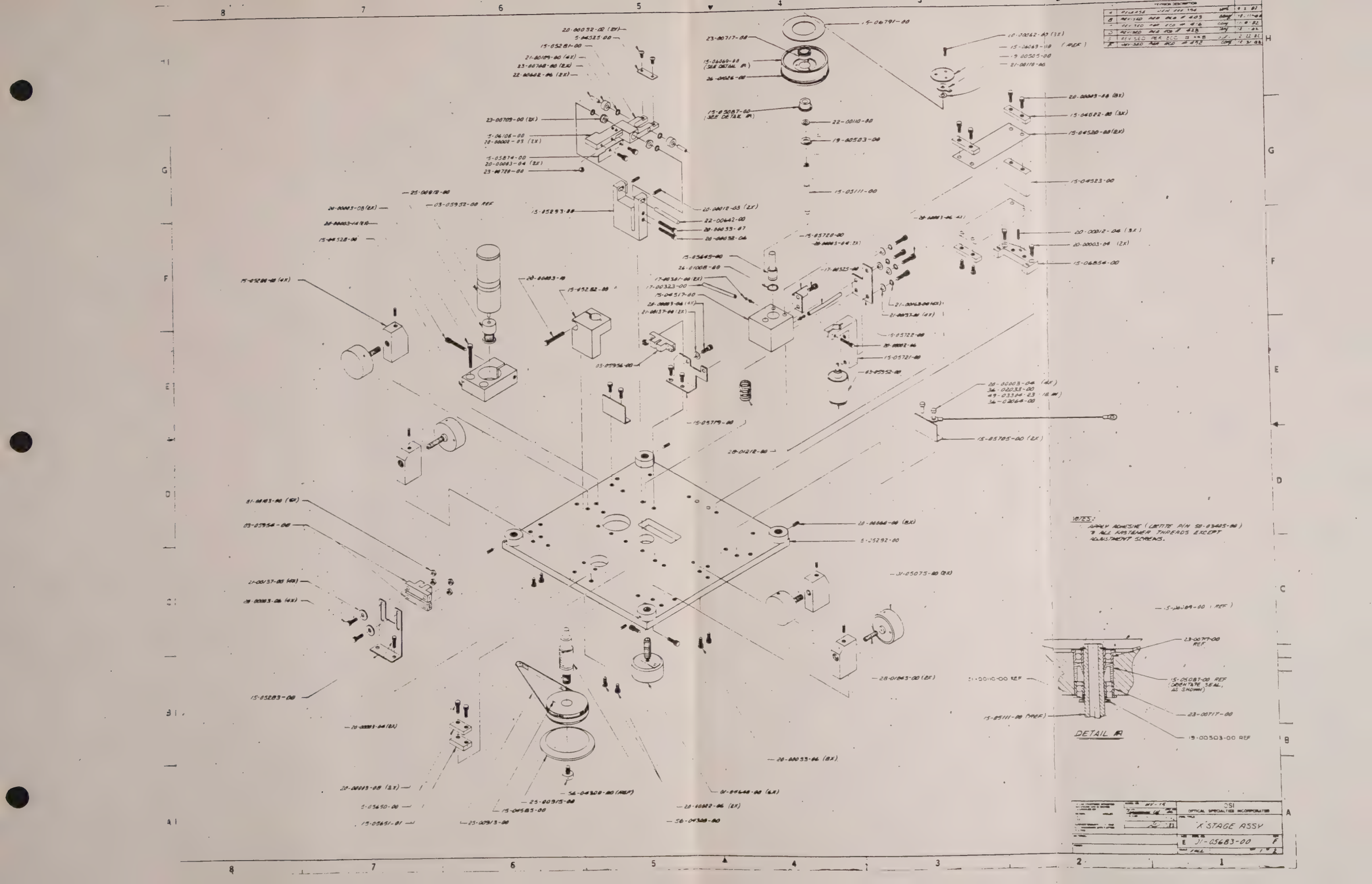
OSI
OPTICAL SPECIALTIES INCORPORATED

C. BAILEY 12-82

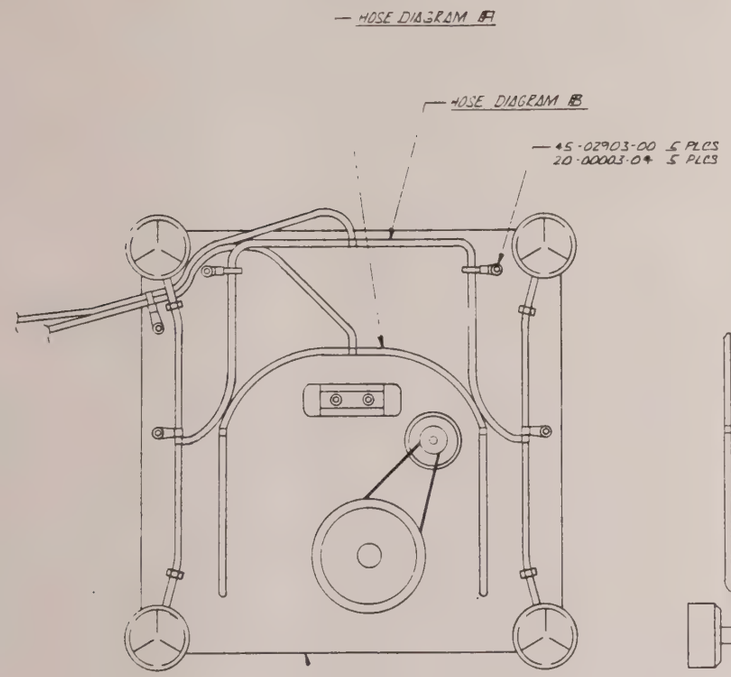
CASSETTE LOADER ASS'Y

D 01-04981-00 G

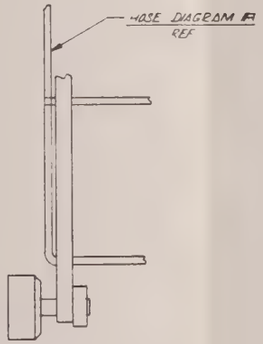
SCALE FULL SHT 1 OF 1

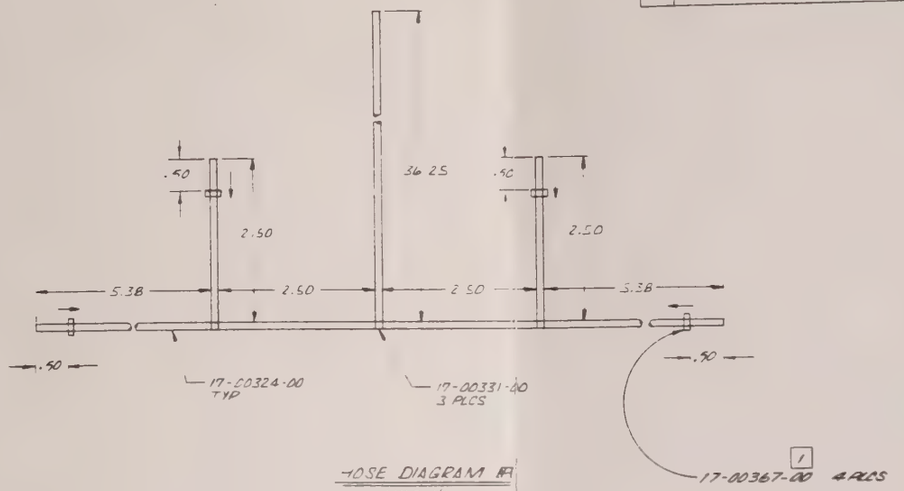

NOTES:
APPLY ADHESIVE (LOCTITE P/N 59-03405-00) TO ALL FASTENER THREADS EXCEPT ADJUSTMENT SCREWS.
DETAIL A
OSI
OPTICAL SPECIALTIES INCORPORATED
X STAGE ASSY
SI-05683-00

LTR	REVISION DESCRIPTION
—	— SEE SHT. 1 —

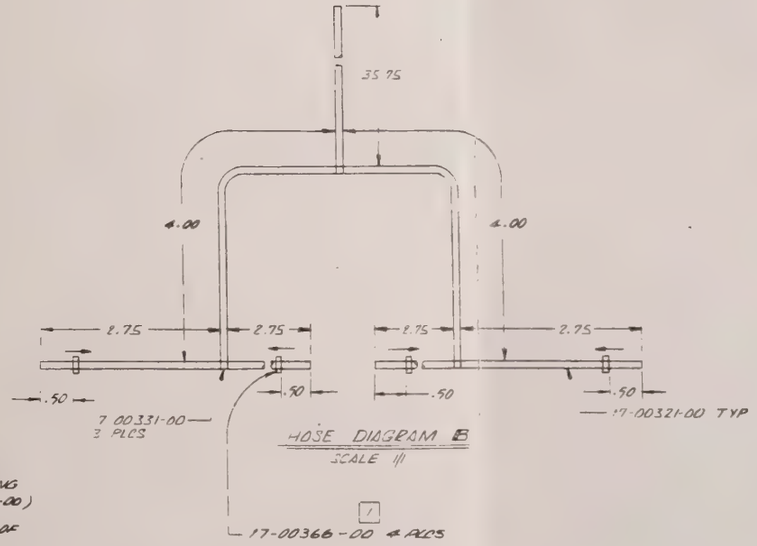


BOTTOM VIEW





HOSE DIAGRAM #A
SCALE 1/1



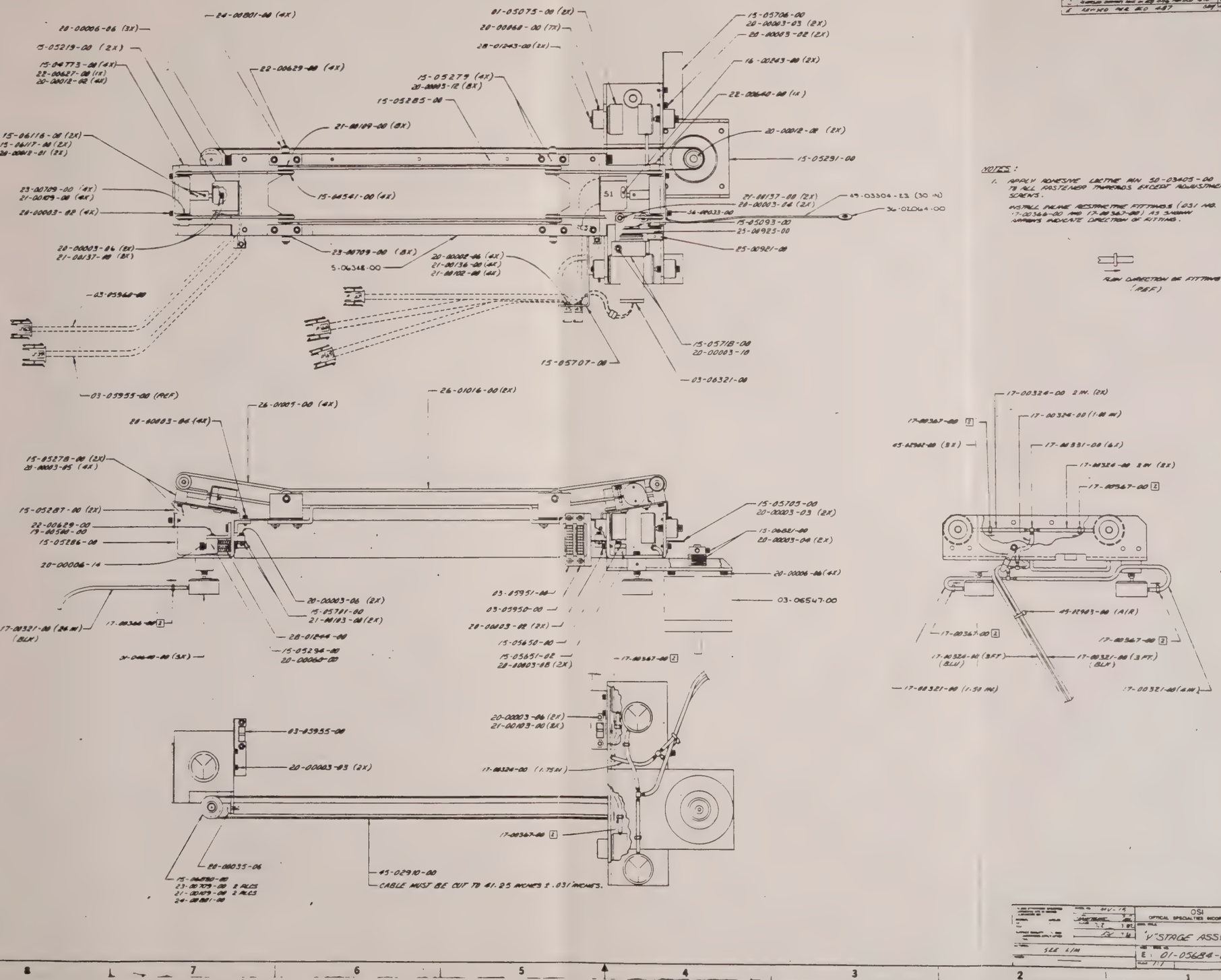
HOSE DIAGRAM #B
SCALE 1/1

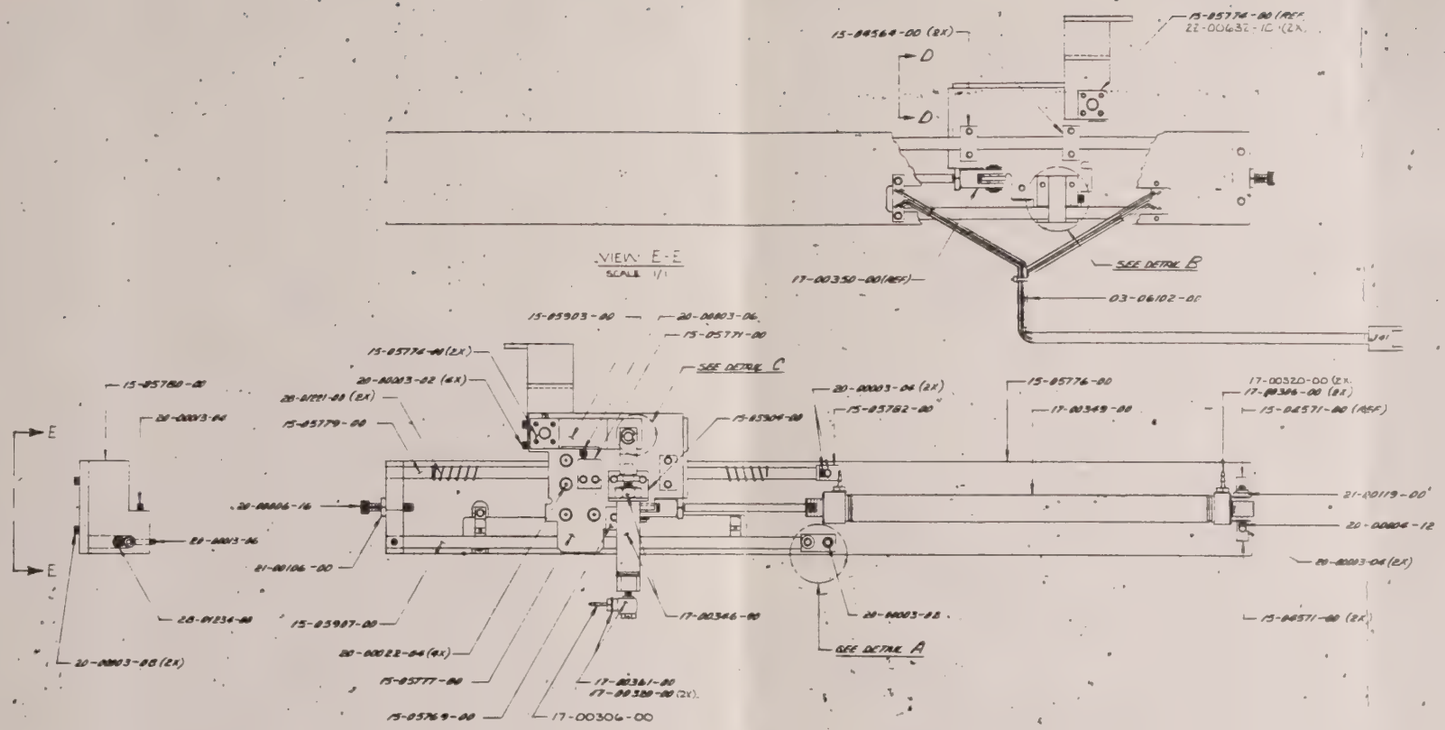
NOTES:

1. INSTALL INLINE RESTRICTIVE FITTING (OSI NO. 17-00366 AND 17-00367-00) AS SHOWN. ARROWS INDICATE FLOW DIRECTION OF FITTING

FLOW DIRECTION OF FITTING (REF)

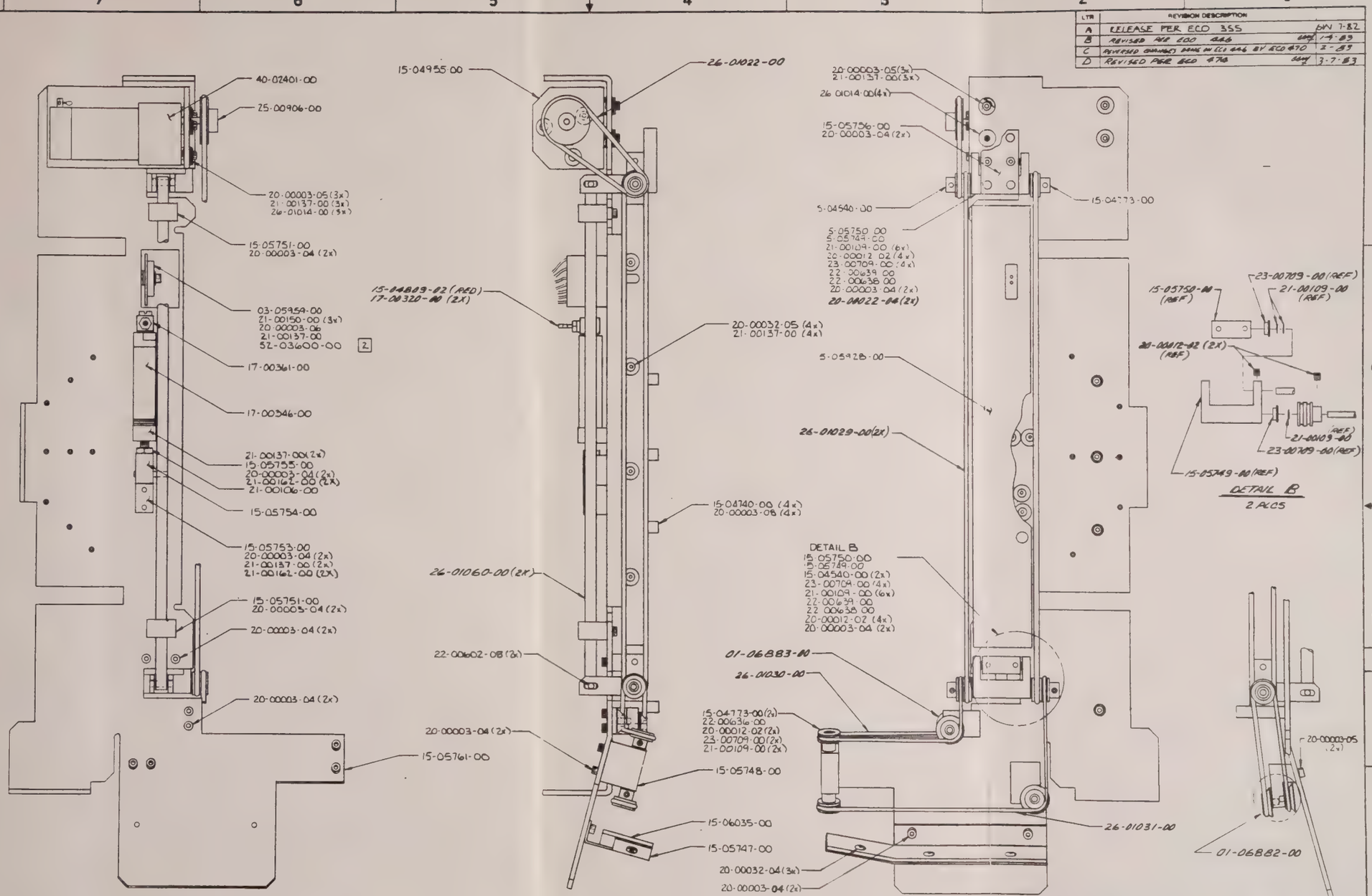
MODEL NO MV-13	OSI OPTICAL SPECIALTIES INCORPORATED	
DRAWN	DWG TITLE "X" STAGE ASSY	
CHECKED		
SURFACE QUALITY		
MATERIAL SEE L/M	SIZE D DWG NO 01-05683-00	REV F
	SCALE 1/1	SHT 2 OF 2


24-00801-00 (4X)
28-00006-06 (3X)
15-05219-00 (2X)
15-04773-00 (4X)
22-00627-00 (1X)
20-00012-02 (4X)
22-00629-00 (4X)
01-05075-00 (2X)
20-00060-00 (7X)
28-01243-00 (2X)
15-05279 (4X)
20-00003-12 (8X)
15-05285-00
21-00109-00 (8X)
15-05706-00
20-00003-03 (2X)
20-00003-02 (2X)
16-00243-00 (2X)
22-00640-00 (1X)
20-00012-02 (2X)
15-05291-00
15-06116-00 (2X)
15-06117-00 (2X)
28-00018-01 (8X)
23-00709-00 (4X)
21-00109-00 (4X)
28-00003-02 (4X)
15-04541-00 (4X)
S1
27-00197-00 (2X)
20-00003-04 (2X)
49-03304-E3 (30 IN)
36-01004-00
34-00033-00
15-05093-00
25-00925-00
25-00921-00
20-00003-04 (8X)
21-00137-00 (8X)
23-00709-00 (8X)
5-06348-00
20-00002-06 (4X)
21-00136-00 (4X)
21-00102-00 (4X)
03-05956-00
15-05718-00
20-00003-10
15-05707-00
03-06321-00
NOTES:
1. APPLY ADHESIVE LOCTITE MIN 50-03405-00 TO ALL FASTENERS THREADS EXCEPT ADJUSTMENT SCREWS.
INSTALL INLINE RESTRICTIVE FITTINGS (QTY PER 17-00366-00 AND 17-00367-00) AS SHOWN ARROWS INDICATE DIRECTION OF FITTING.
FLOW DIRECTION OF FITTING (REF.)
03-05955-00 (REF)
26-01016-00 (2X)
28-00003-04 (4X)
26-00009-00 (4X)
15-05278-00 (2X)
20-00003-05 (4X)
15-05287-00 (2X)
22-00629-00
19-00580-00
15-05286-00
20-00006-14
17-00321-00 (24 IN) (BLK)
17-00366-00 2
34-00040-00 (5X)
20-00003-06 (2X)
15-05701-00
21-00103-00 (2X)
28-01244-00
15-05294-00
20-00060-00
15-05703-00
20-00003-03 (2X)
15-06681-00
20-00003-04 (2X)
20-00006-06 (4X)
03-06547-00
03-05951-00
03-05950-00
20-00003-02 (2X)
15-05650-00
15-05651-02
20-00003-08 (2X)
17-00367-00 2
17-00324-00 2 IN. (2X)
17-00324-00 (1.00 IN)
17-00367-00 2
45-02904-00 (3X)
17-00331-00 (6X)
17-00324-00 2 IN (8X)
17-00367-00 2
45-02903-00 (A/R)
17-00367-00 2
17-00324-00 (3 FT) (BLU)
17-00321-00 (3 FT) (BLK)
17-00321-00 (1.50 IN)
17-00321-00 (4 IN)
03-05955-00
20-00003-03 (2X)
20-00003-06 (2X)
21-00103-00 (2X)
17-00324-00 (1.75 IN)
17-00367-00 2
28-00035-06
15-04780-00
23-00709-00 2 REQ'S
21-00109-00 2 REQ'S
24-00801-00
45-02910-00
CABLE MUST BE CUT TO 41.25 INCHES ± .03 INCHES.
OSI
OPTICAL SPECIALTIES INCORPORATED
'V' STAGE ASSY
SIZE E
01-05684-00
E



NOTES:
1. APPLY LOCTITE P/N 52-03405-0C TO ALL FASTENER THREADS EXCEPT ADJUSTMENT SCREWS.

	MV-15	OSI OPTICAL SPECIALTIES INCORPORATED
		TRANSFER ASSY.
		E 01-05685-00 1



LTR	REVISION DESCRIPTION	
A	RELEASE PER ECO 355	BW 7-82
B	REVISED PER ECO 446	GMS 1-9-83
C	REVISED DRAWING DUE TO ECO 446 & ECO 470	2-83
D	REVISED PER ECO 478	GMS 3-7-83

NOTES:

1. APPLY ADHESIVE (LOCTITE P/N 50-03405-00) TO ALL FASTENER THREADS EXCEPT ADJUSTMENT SCREWS.
2. LABEL #42 ON CONNECTOR OF SENSOR HARNESS 03-05959-00

SEE L/M

MODEL NO MV-15

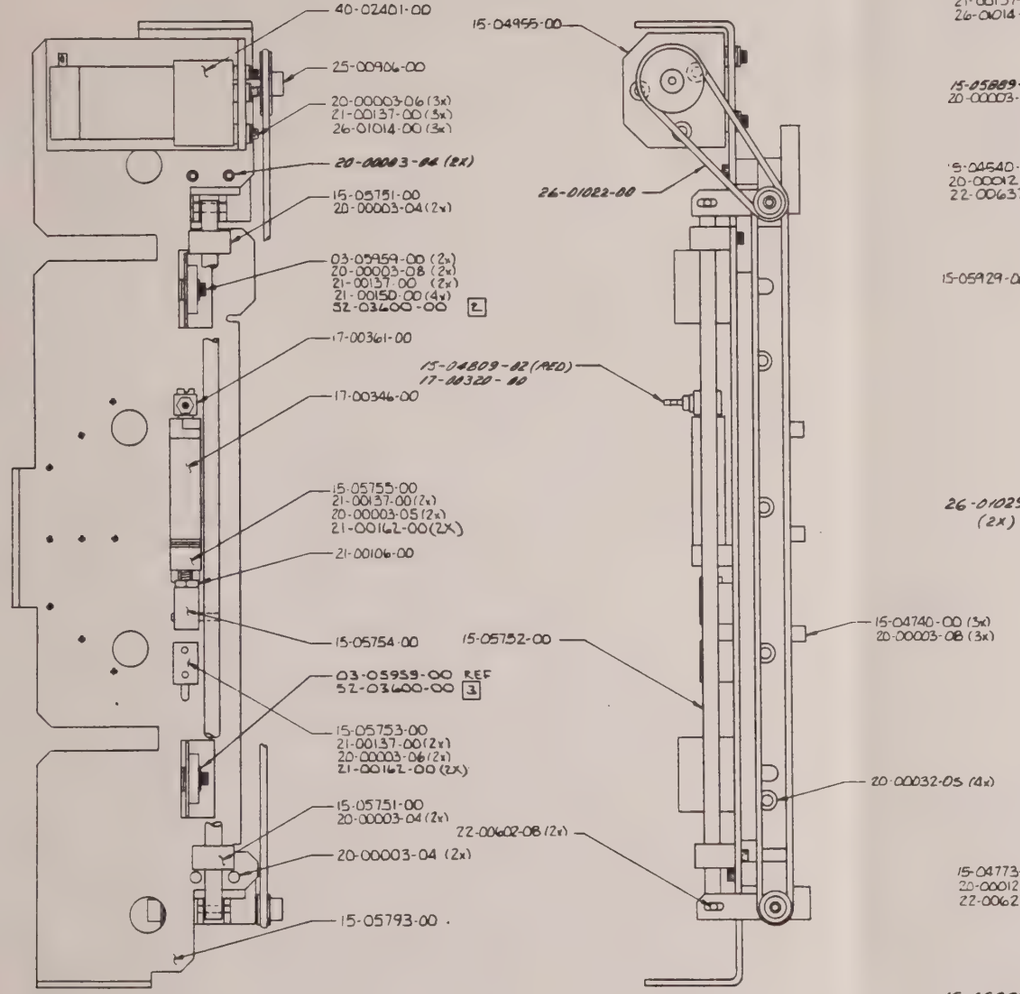
OSI
OPTICAL SPECIALTIES INCORPORATED

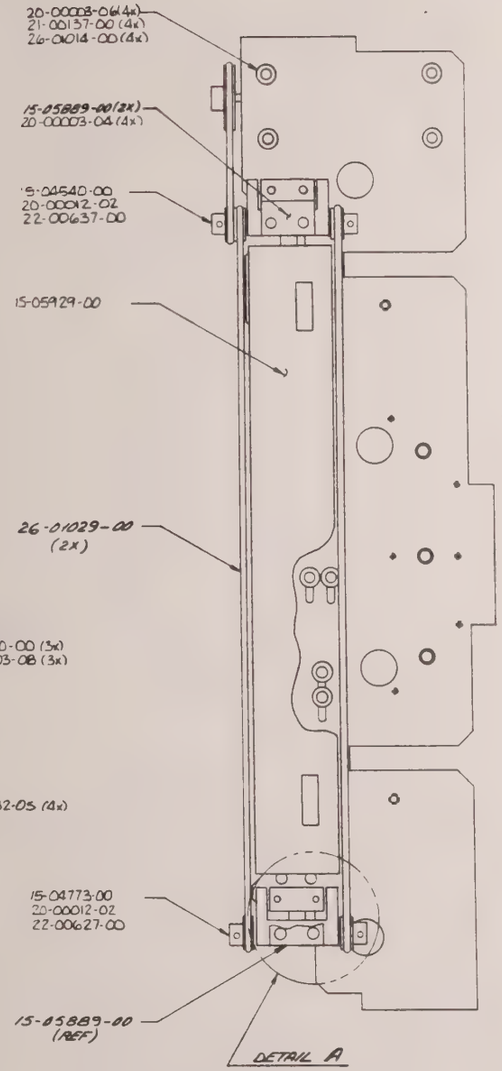
DWG TITLE
ASSY
WAFER FEED RT

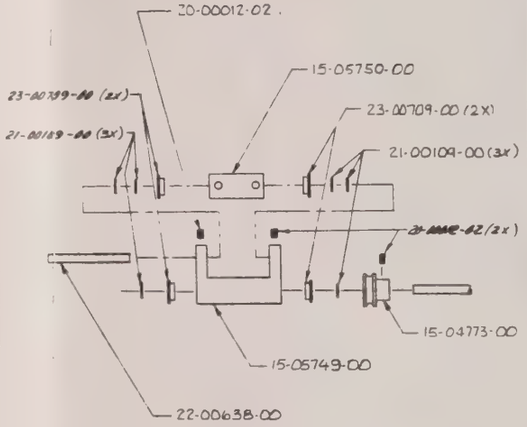
SIZE D | DWG NO 01-05686-00 | REV D

SCALE FULL

LTR	REVISION DESCRIPTION	
A	RELEASE PER ECO 355	JWV 7-82
B	REVISED PER ECO 444	JWV 1-83
C	REVISED CHANNEL NAME ON ECO 454 PER ECO 470	JWV 2-83



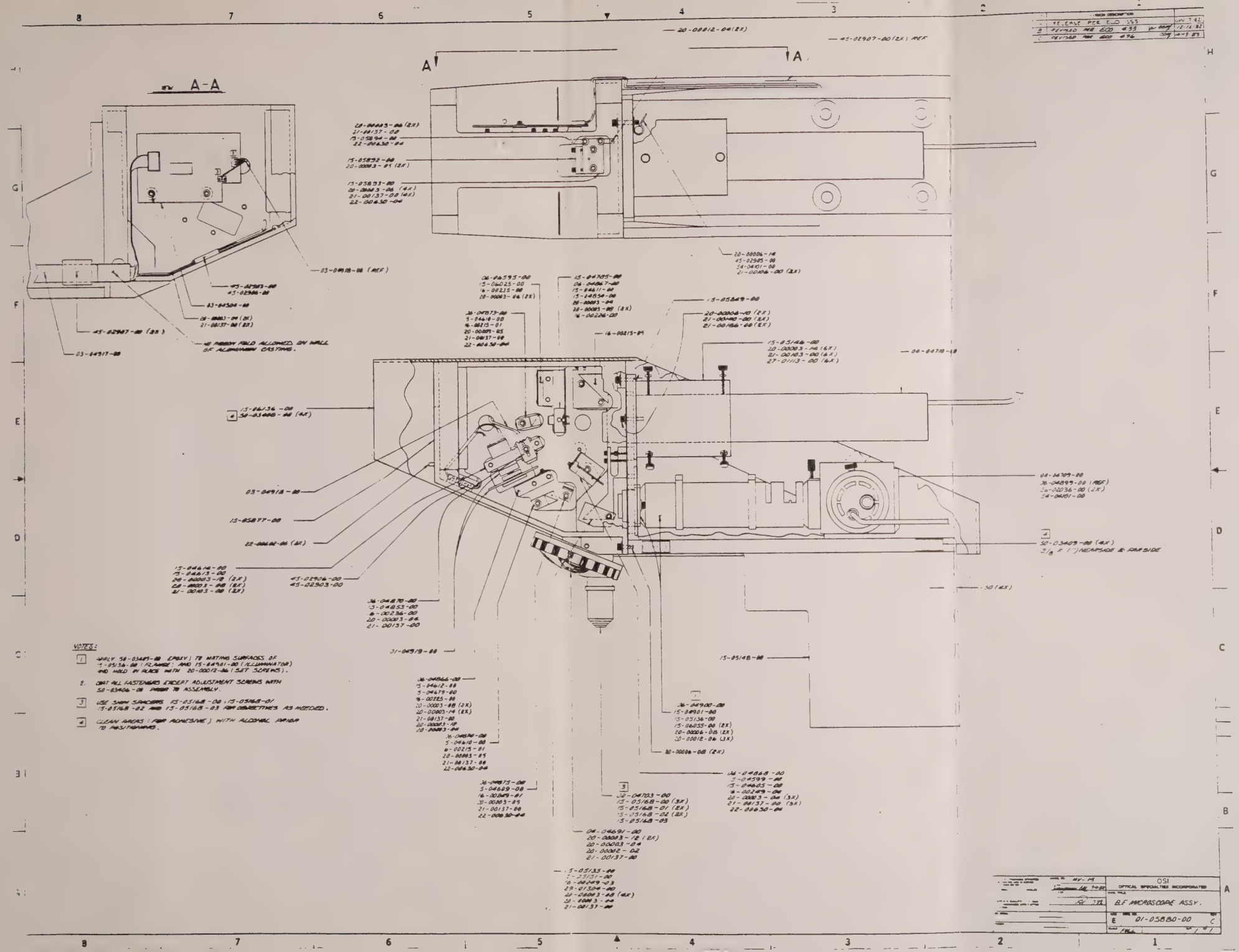




DETAIL A
2 PLCS

NOTES:
1. APPLY ADHESIVE (LOCTITE PIN 50-03405-00) TO ALL FASTENER THREADS EXCEPT ADJUSTMENT SCREWS.
2. LABEL #48 ON CONNECTOR OF SENSOR ASSY AT THIS LOCATION
3. LABEL #49 ON CONNECTOR OF SENSOR ASSY AT THIS LOCATION

MODEL NO MV 15	OSI OPTICAL SPECIALTIES INCORPORATED	
DRAWN Kathan 7-82	DWG. TITLE ASSY WAFER FEED LT.	
CHECKED 7-82		
APPROVED 7-82		
MATERIAL SEE 2/M	SIZE D	DWG. NO 01-05687-00 REV C
	SCALE FULL	SHT 1 OF 1



NOTES:

1. APPLY 50-03409-00 (EPOXY) TO MATING SURFACES OF 1-05136-00 (FLANGE) AND 15-04901-00 (ILLUMINATOR) AND HOLD IN PLACE WITH 20-00012-04 (SET SCREWS).
2. OMIT ALL FASTENERS EXCEPT ADJUSTMENT SCREWS WITH 50-03406-00 PRIOR TO ASSEMBLY.
3. USE SHIM SPACERS 15-05168-00 ; 15-05168-01 15-05168-02 AND 15-05168-03 AS NEEDED.
4. CLEAN MIRRORS (FOR MONOSCOPE) WITH ALCOHOL PRIOR TO ASSEMBLING.

ITEM	DESCRIPTION	BY	DATE
-	RELEASE PER E.O. 555		JAN 7 82
B	REVISED PER ECO 493	JW	12-16-82
A	REVISED PER ECO 496	JW	4-9-83

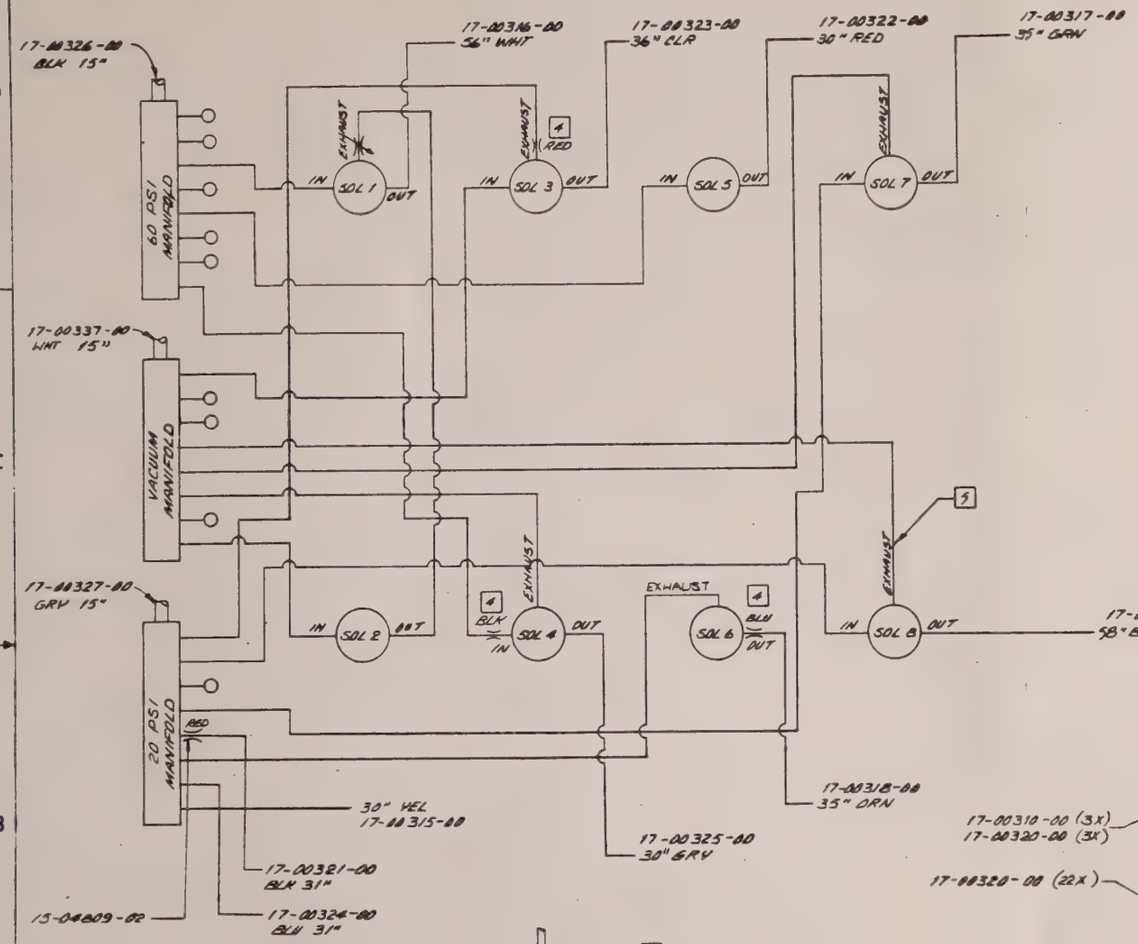
OSI
OPTICAL SPECIALTIES INCORPORATED

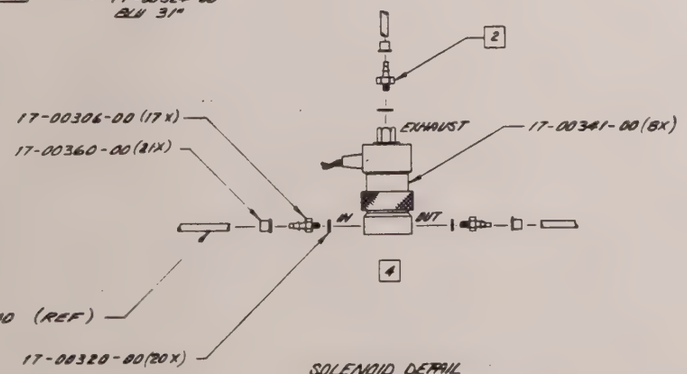
B.F. MICROSCOPE ASSY.

E 01-05880-00 C

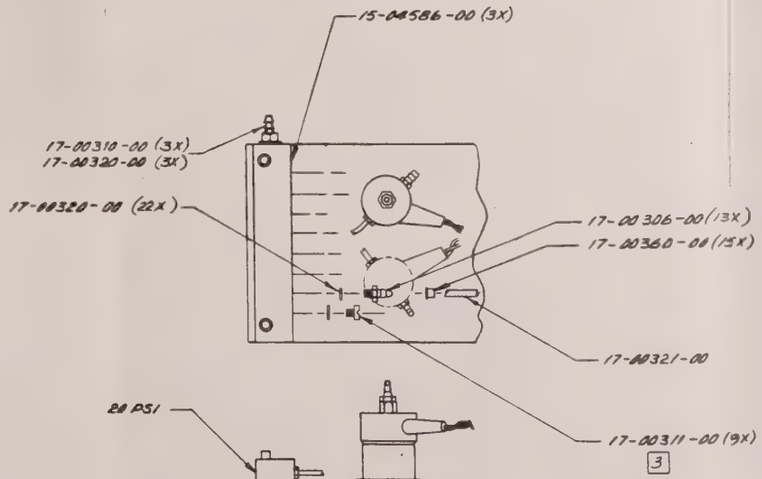
SCALE 1/1 SHT 1 OF 1

LTR	REVISION DESCRIPTION	
A	RELEASE PER ECO 355	GMV 7-82
B	REVISED PER ECO 420	DCM 11-29-82
C	PER ECO 487	DCM 4-7-83





SOLENOID DETAIL



MANIFOLD DETAIL

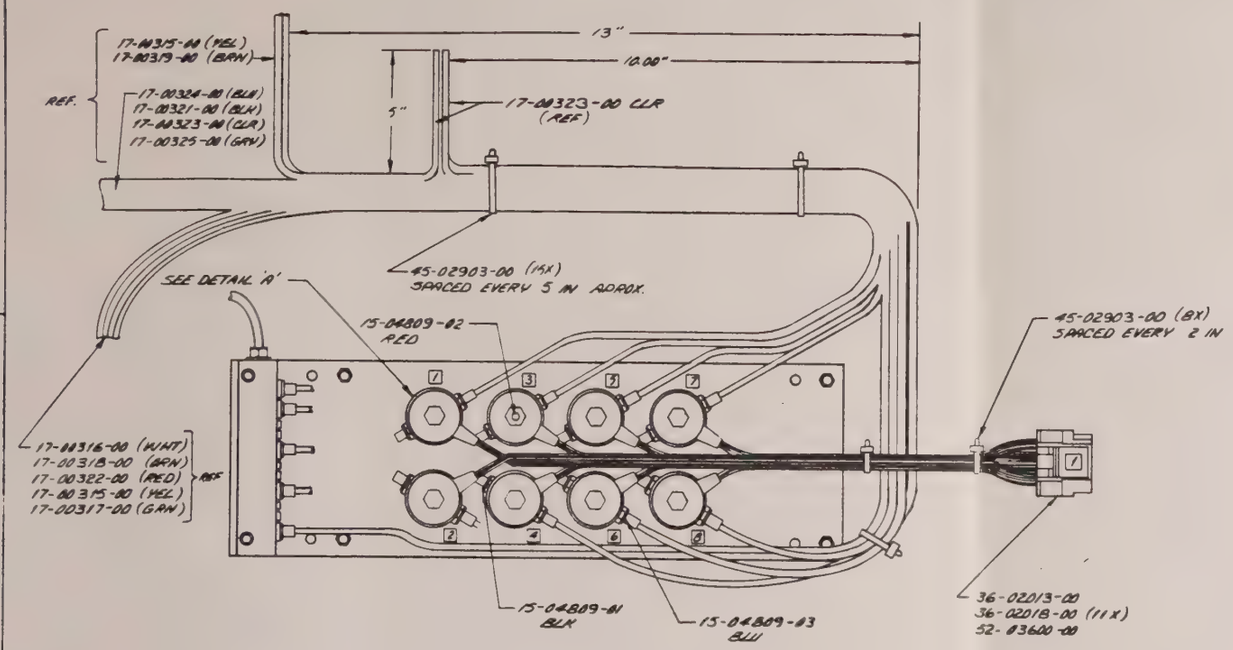
NOTES:

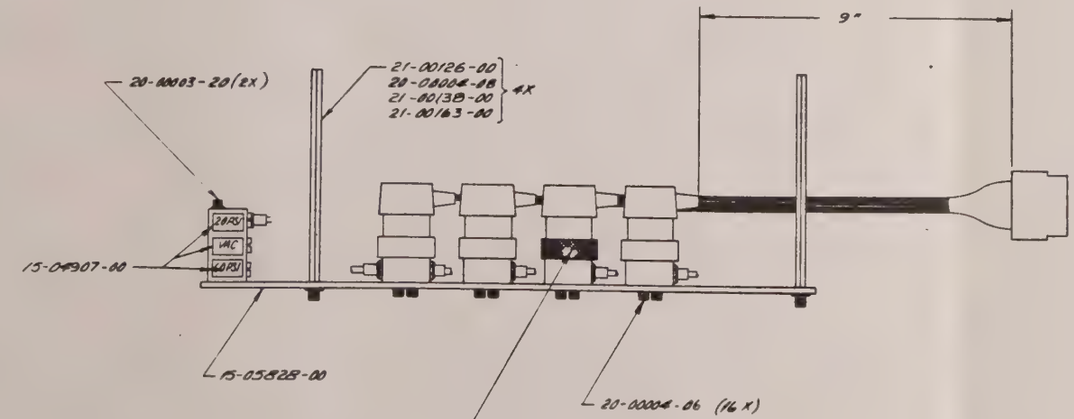
1. ROUTE ALL HOSES BETWEEN SOLENOIDS.
2. IF EXHAUST IS NOT USED EXCLUDE FITTINGS.
3. PLUG ALL REMAINING HOLES OF MANIFOLDS WITH GASKETS AND PLUG (ITEMS 17-00320-00 AND 17-00311-00).
4. INSTALL ITEMS 17-00306-00 AND 17-00320-00 IN ALL SOLENOID IN AND OUT PORTS EXCEPT AS LISTED BELOW:
   - A) SOLENOID NO. 1 EXHAUST PORT INSTALL ITEMS 17-00306-00, 17-00313-00, 17-00308-00 AND 17-00320-00 AS SHOWN IN DETAIL "A" ON PAGE 2.
   - B) SOLENOID NO. 3 "EXHAUST" PORT INSTALL ITEMS 15-04809-02 AND 17-00320-00.
   - C) SOLENOID NO. 4 "IN" PORT INSTALL ITEMS 15-04809-01 AND 17-00320-00.
   - D) SOLENOID NO. 6 "OUT" PORT INSTALL ITEMS 15-04809-03 AND 17-00320-00.
5. ALL UNMARKED HOSE BETWEEN MANIFOLDS AND SOLENOIDS IS BLK.
6. APPLY ADHESIVE (LOCTITE P/N 50-03405-00) TO ALL FASTENER THREADS EXCEPT ADJUSTMENT SCREWS.

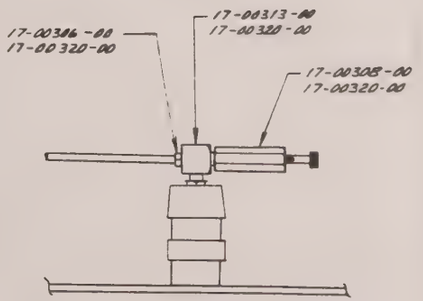
PNEUMATIC SCHEMATIC
07-06064-00 (REF)

	MV-15	OSI OPTICAL SPECIALTIES INCORPORATED
		DWG TITLE: ASSY SOLENOID
		SIZE D · DWG NO 01-05834-00 · REV C
		SCALE NONE · SHT 1 OF 2

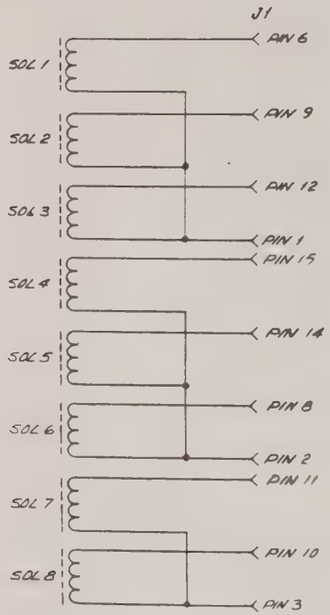
LTR	REVISION DESCRIPTION		
A	RELEASE PER ECO 355		GW 7-82
B	REVISED PER ECO 428	CDW	11-29-82
C	" PER ECO 487	MM	4-7-83



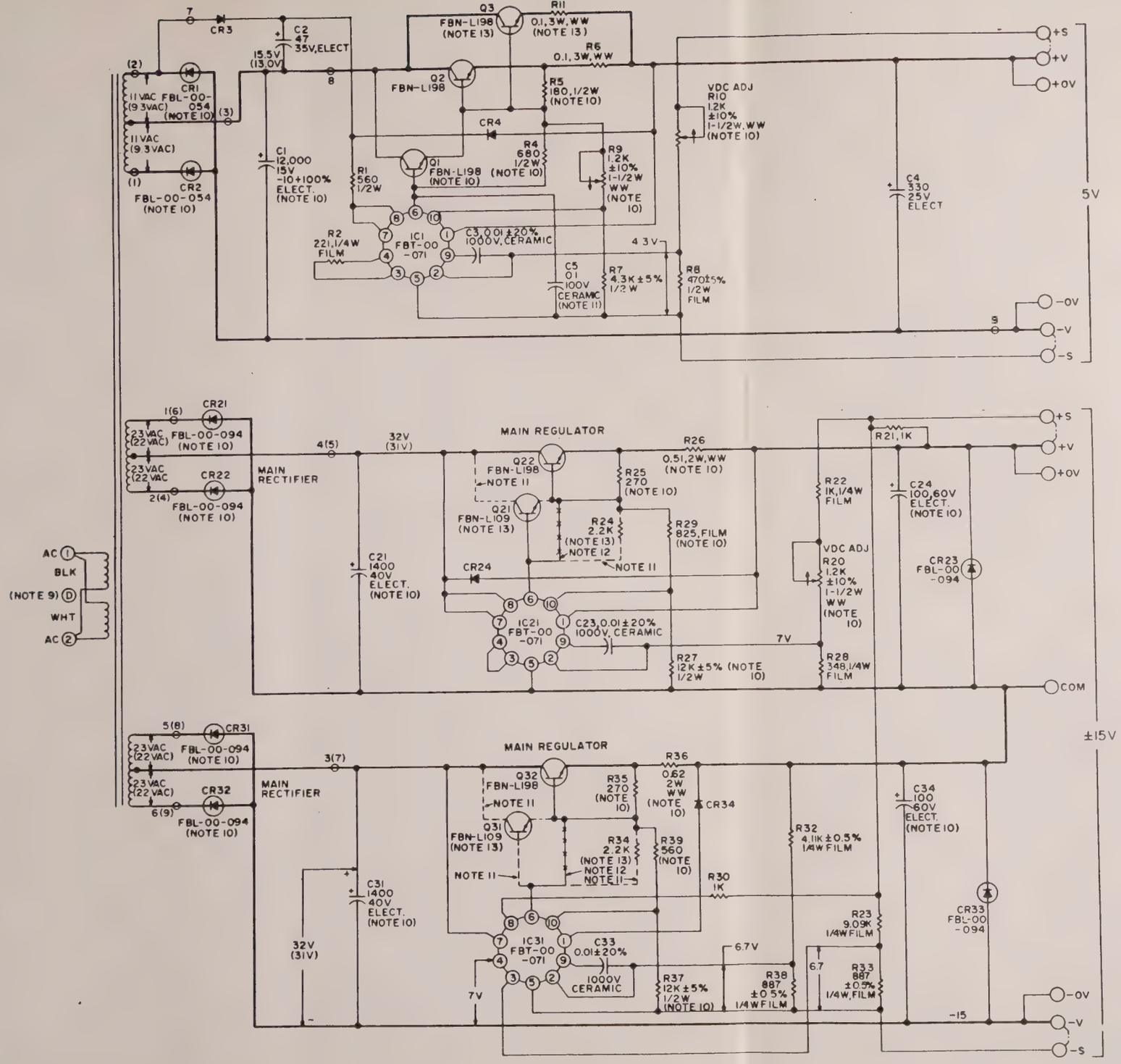




DETAIL "A"
SOLENOID # 1 [4] SEE NOTES ON PAGE 1



	MV-15	OSI OPTICAL SPECIALTIES INCORPORATED
	CHARLES TERRAN 3-82	DWG. TITLE: ASSY SOLENOID
		SIZE D · DWG. NO. 01-05834-00 · REV C
		SCALE NONE · SHT 2 OF 2



NOTES:

1. RESISTORS ARE CARB.FILM 1/4W WITH VALUES IN OHMS, UNLESS OTHERWISE NOTED.
2. RESISTOR TOLERANCES: CARB.FILM ±5%, FILM ±1%, WIREWOUND 5%, UNLESS OTHERWISE NOTED
3. CAPACITOR VALUES ARE IN MICROFARADS.
4. CAPACITOR TOLERANCES: ELECTROLYTIC −10+75%.
5. DESIGNATIONS ARE LAMBDA PART NUMBERS.
6. SYMBOLS:
   - INDICATES CLOCKWISE ROTATION OF SHAFT.
   - INDICATES CONNECTION TO CHASSIS.
   - LAMBDA PART NO. FBL-00-030; USE IN4002 DIODE FOR REPLACEMENT UNLESS OTHERWISE NOTED.
   - INDICATES TERMINAL ON PRINTED CIRCUIT BOARD. TERM NOS. IN PARENTHESIS APPLY ONLY TO LOT-X-5152-A. TERM NOS. NOT IN PARENTHESIS APPLY ONLY TO LOT-W-5152-A.
   - INDICATES ACTUAL UNIT MARKING.
7. CONDITIONS FOR CIRCUIT POINT MEASUREMENTS: INPUT: 115 VAC, 60 Hz RATED VOLTAGE NO LOAD. INDICATED VOLTAGES ARE TYPICAL VALUES AND ARE D.C., UNLESS OTHERWISE NOTED, D.C. MEASUREMENTS TAKEN WITH 20,000 OHMS/V VOLTMETER BETWEEN COM. AND INDICATED POINTS FOR ±15V OUTPUT; BETWEEN −V AND INDICATED POINTS FOR 5V OUTPUT UNLESS OTHERWISE NOTED. VOLTAGES IN PARENTHESIS APPLY ONLY TO LOT-X-5152-A. A SINGLE READING APPLIES TO BOTH MODELS.
8. DERATE CURRENT 10% FOR 47-53 Hz INPUT. FOR 63-440 Hz CONSULT FACTORY.
9. T1 PRIMARY CONNECTION SHOWN IS FOR 105-125 VAC INPUT. FOR 210-250 VAC INPUT: DISCONNECT BLK & WHT TRANSFORMER LEADS FROM TERMINAL AC1 & AC2 RECONNECT BOTH LEADS TO TERM D.
10. COMPONENT VALUES LISTED IN THE FOLLOWING TABLE REFER TO MODEL LOT-X-5152-A.

COMP DESIG	VALUE	COMP DESIG	VALUE
C1	6900 MF	R5	390, 1/2W
C21, C31	1000MF		
C24, C34	47MF, 35V	R9	750 ±5%, 1/2W, COMP, FIXED
CR1, CR2	FBL-00-116	R10	12K ±20%, 1W CERMET
CR21, CR22 CR23, CR31 CR32, CR33	FBL-00-030	R20	1K ±10%, 1W, CERMET
Q1	FBN-L113	R25, R35 R26, R36	1.2K 0.91, 2W, WW
R1	820, 1/2W COMP	R27, R37	12K ±5%, 1/4W, FILM
R4	4.7K, 1/2W	R29	680 ±2%, FILM
		R39	330

11. ONLY USED ON LOT-W-5152-A.
12. ONLY USED ON LOT-X-5152-A.
13. R11, R24, R34, Q21, Q31 AND Q3 ONLY USED ON LOT-W-5152-A.

FOR WIRING OF POWER SUPPLY TO LOAD REFER TO SUPPLY-TO-LOAD WIRING DIAGRAMS.

DOTTED CONNECTIONS SHOWN ON OUTPUT TERMS INDICATE JUMPERS IN PLACE FOR LOCAL SENSING CONNECTION

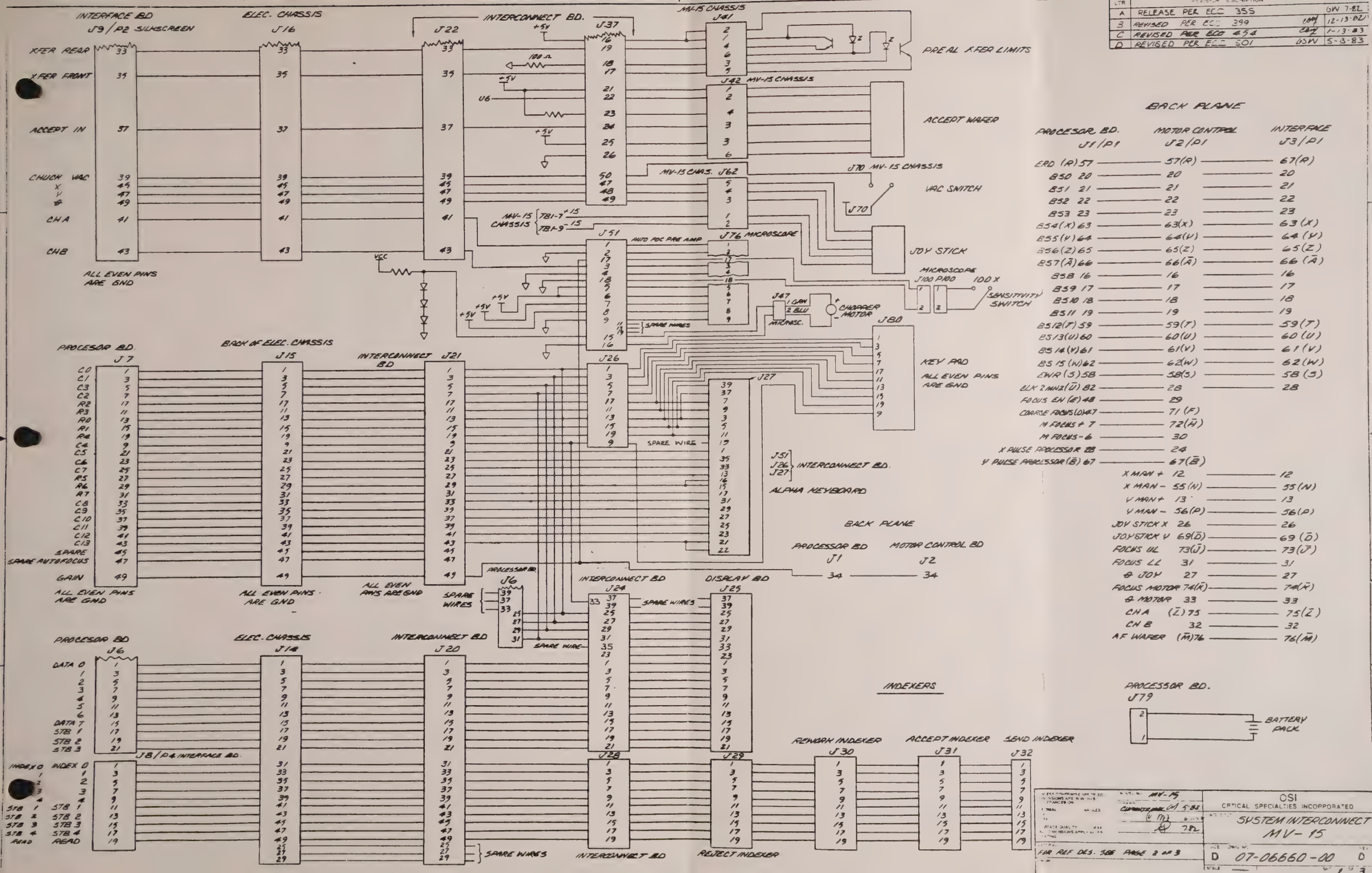
SCHEMATIC DIAGRAM
REGULATED POWER SUPPLY

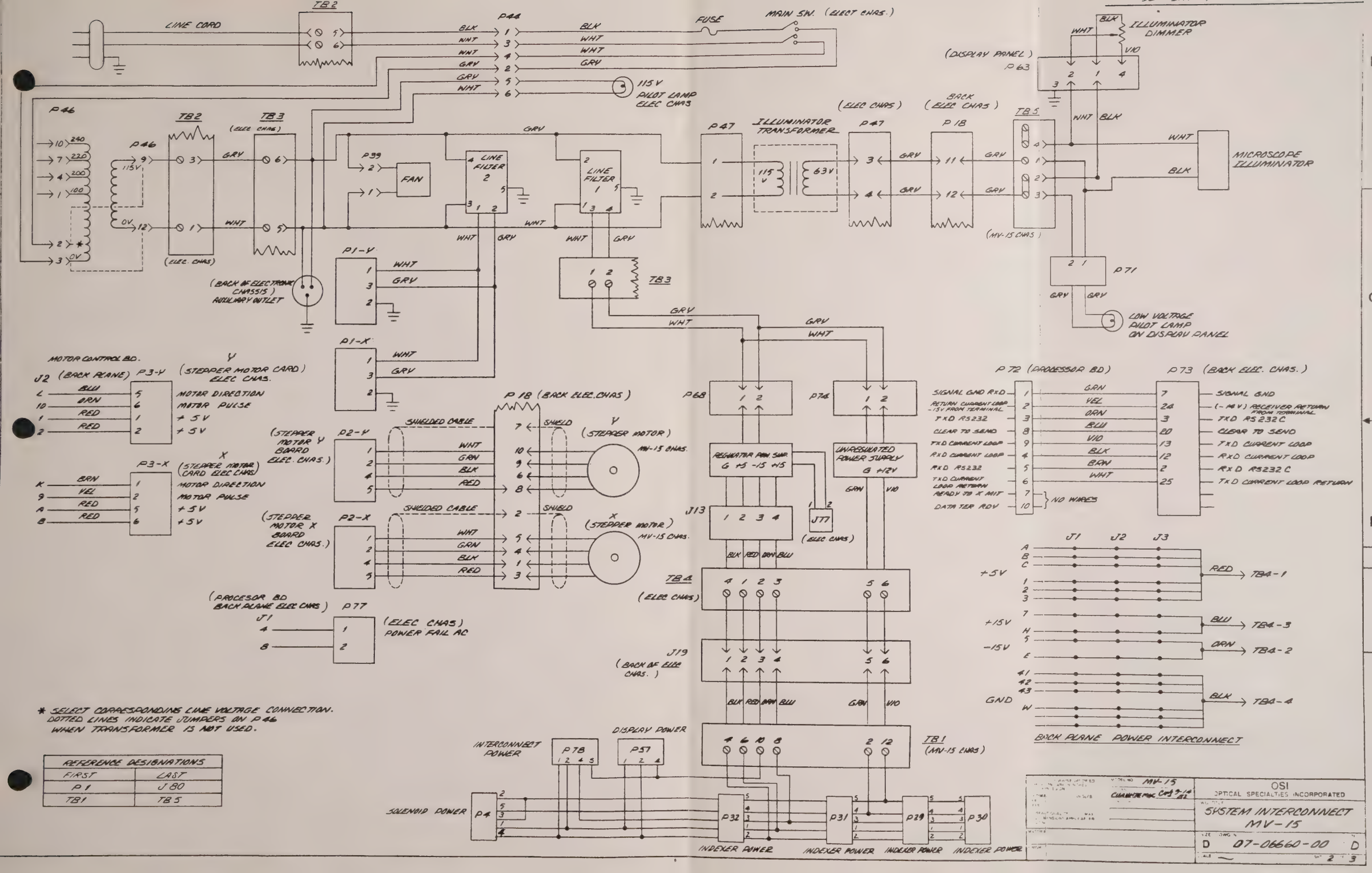
MODELS
LOT-W-5152-A
LOT-X-5152-A

LAMBDA

ELECTRONICS
MELVILLE, NEW YORK

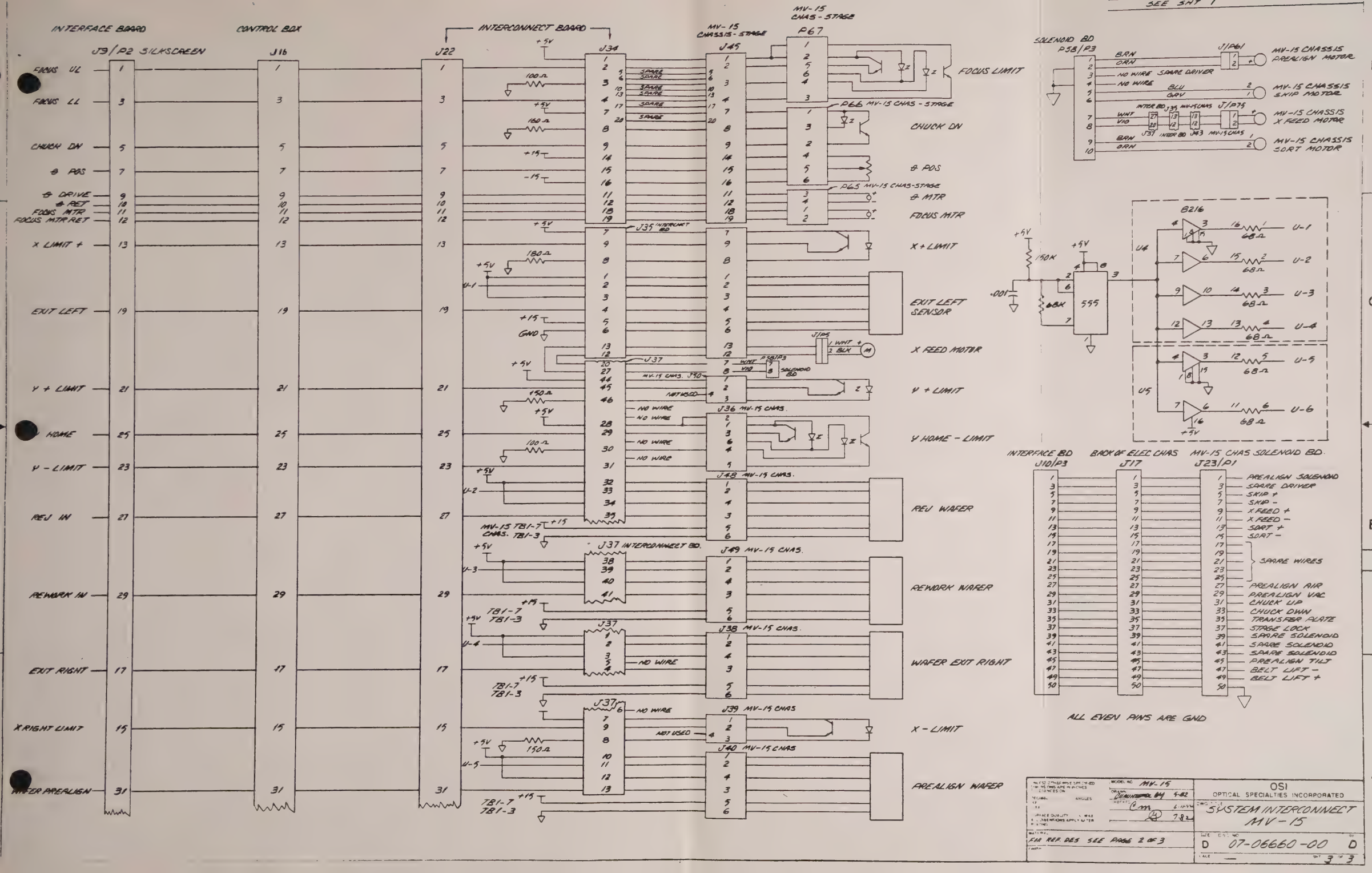
DIVISION OF Veeco INSTRUMENTS INC.


INTERFACE BD
J3/P2 SILKSCREEN
ELEC. CHASSIS
J16
INTERCONNECT BD.
J22
J37
MAIN CHASSIS
J41
PREAL XFER LIMITS
J42 MV-15 CHASSIS
ACCEPT WAFER
J70 MV-15 CHASSIS
VAC SWITCH
J70
MV-15 CHAS. J62
JOY STICK
J76 MICROSCARE
MICROSCOPE
J100 P100
100 X
SENSITIVITY SWITCH
J47
CHOPPER MOTOR
MICRASC.
J80
KEY PAD
ALL EVEN PINS ARE GND
XFER REAR
XFER FRONT
ACCEPT IN
CHUCK VAC
X
Y
θ
CH A
CH B
ALL EVEN PINS ARE GND
AUTO FOC PRE AMP
SPARE WIRES
PROCESOR BD.
J7
BACK OF ELEC. CHASSIS
J15
INTERCONNECT BD
J21
J26
J27
SPARE WIRE
J51
J26
J27
INTERCONNECT BD.
ALPHA KEYBOARD
ALL EVEN PINS ARE GND
ALL EVEN PINS ARE GND
ALL EVEN PINS ARE GND
SPARE AUTOFOCUS
GAIN
SPARE WIRES
PROCESSOR BD.
J6
INTERCONNECT BD
J24
DISPLAY BD
J25
SPARE WIRES
SPARE WIRE
BACK PLANE
PROCESSOR BD
J1
MOTOR CONTROL BD
J2
34
34
PROCESOR BD
J6
ELEC. CHASSIS
J14
INTERCONNECT BD
J20
DATA 0
DATA 7
STB 1
STB 2
STB 3
J8/P4 INTERFACE BD.
INDEX 0
STB 1
STB 2
STB 3
STB 4
AND
INDEX 0
STB 1
STB 2
STB 3
STB 4
READ
SPARE WIRES
INTERCONNECT BD
J28
REJECT INDEXER
J29
INDEXERS
REWORK INDEXER
J30
ACCEPT INDEXER
J31
SEND INDEXER
J32
PROCESSOR BD.
J79
BATTERY PACK
BACK PLANE
PROCESSOR BD. J1/P1
MOTOR CONTROL J2/P1
INTERFACE J3/P1
ERD (R) 57 — 57(R) — 67(R)
BS0 20 — 20 — 20
BS1 21 — 21 — 21
BS2 22 — 22 — 22
BS3 23 — 23 — 23
BS4(X) 63 — 63(X) — 63(X)
BS5(Y) 64 — 64(Y) — 64(Y)
BS6(Z) 65 — 65(Z) — 65(Z)
BS7(Ā) 66 — 66(Ā) — 66(Ā)
BS8 16 — 16 — 16
BS9 17 — 17 — 17
BS10 18 — 18 — 18
BS11 19 — 19 — 19
BS12(T) 59 — 59(T) — 59(T)
BS13(U) 60 — 60(U) — 60(U)
BS14(V) 61 — 61(V) — 61(V)
BS15(W) 62 — 62(W) — 62(W)
EWR (S) 58 — 58(S) — 58(S)
CLK 2 MHz(Ū) 82 — 28 — 28
FOCUS EN (E) 48 — 29
COARSE FOCUS (D) 47 — 71 (F)
M FOCUS + 7 — 72(H̄)
M FOCUS - 6 — 30
X PULSE PROCESSOR 28 — 24
Y PULSE PROCESSOR (Ē) 67 — 67(Ē)
X MAN + 12 — 12
X MAN - 55(N) — 55(N)
Y MAN + 13 — 13
Y MAN - 56(P) — 56(P)
JOY STICK X 26 — 26
JOY STICK Y 69(D̄) — 69(D̄)
FOCUS UL 73(J̄) — 73(J̄)
FOCUS LL 31 — 31
θ JOY 27 — 27
FOCUS MOTOR 74(K̄) — 74(K̄)
θ MOTOR 33 — 33
CH A (Z̄) 75 — 75(Z̄)
CH B 32 — 32
AF WAFER (M̄) 76 — 76(M̄)
LTR
A RELEASE PER ECC 355 GW 7-82
B REVISED PER ECC 399 12-13-82
C REVISED PER ECO 454 1-13-83
D REVISED PER ECC 501 5-3-83
OSI
OPTICAL SPECIALTIES INCOPPORATED
SYSTEM INTERCONNECT
MV-15
D 07-06660-00 D



* SELECT CORRESPONDING LINE VOLTAGE CONNECTION. DOTTED LINES INDICATE JUMPERS ON P46 WHEN TRANSFORMER IS NOT USED.

REFERENCE DESIGNATIONS	
FIRST	LAST
P1	J80
TB1	TB5


INTERFACE BOARD
CONTROL BOX
INTERCONNECT BOARD
J3/P2 SILKSCREEN
J16
J22
J34
J45
P67
MV-15 CHAS-STAGE
FOCUS UL
FOCUS LL
CHUCK DN
Θ POS
Θ DRIVE
Θ RET
FOCUS MTR
FOCUS MTR RET
X LIMIT +
EXIT LEFT
Y + LIMIT
HOME
Y - LIMIT
REJ IN
REWORK IN
EXIT RIGHT
X RIGHT LIMIT
WAFER PREALIGN
FOCUS LIMIT
CHUCK DN
Θ POS
Θ MTR
FOCUS MTR
X + LIMIT
EXIT LEFT SENSOR
X FEED MOTOR
Y + LIMIT
Y HOME - LIMIT
REU WAFER
REWORK WAFER
WAFER EXIT RIGHT
X - LIMIT
PREALIGN WAFER
SEE SHT 1
SOLENOID BD P58/P3
MV-15 CHASSIS PREALIGN MOTOR
MV-15 CHASSIS SKIP MOTOR
MV-15 CHASSIS X FEED MOTOR
MV-15 CHASSIS SORT MOTOR
B216
U4
U5
U-1
U-2
U-3
U-4
U-5
U-6
INTERFACE BD J10/P3
BACK OF ELEC CHAS J17
MV-15 CHAS SOLENOID BD. J23/P1
PREALIGN SOLENOID
SPARE DRIVER
SKIP +
SKIP -
X FEED +
X FEED -
SORT +
SORT -
SPARE WIRES
PREALIGN AIR
PREALIGN VAC
CHUCK UP
CHUCK DWN
TRANSFER PLATE
STAGE LOCK
SPARE SOLENOID
PREALIGN TILT
BELT LIFT -
BELT LIFT +
ALL EVEN PINS ARE GND
OSI
OPTICAL SPECIALTIES INCORPORATED
SYSTEM INTERCONNECT MV-15
D 07-06660-00 D
SHT 3 OF 3

MP MASTER
MA32965